UNIVERSITY OF TORONTO
3 1761 00837209 6

8-K

Digitized by the Internet Archive
in 2008 with funding from
Microsoft Corporation

http://www.archive.org/details/surveysofnatureh02tayluoft

TAYLOR, CHARLES

SURVEYS of NATURE,

HISTORICAL, MORAL,
and
ENTERTAINING,
exhibiting the

PRINCIPLES of NATURAL SCIENCE

in various Branches

by

FRANCIS FITZGERALD Esq.r
Author of the Lectures in the Artist's Repository.

VOL: II.

London, Published by C. Taylor N.o 10 Holborn.

QH
45
T3
V.2
695893
27.2.59

PREFACE

TO THE

SECOND VOLUME.

NATURAL Hiſtory is a ſubject very extenſive in itſelf, and which has been treated by many writers in a manner ſo voluminous, that its information is now rather a ſtudy than an accompliſhment, and much beyond the retention of the memory. In fact, on ſome articles it offers much that ſcarce deſerves retention, while its accounts of others are very limited.

This diviſion of our work is an attempt to preſent a general view of the ſubject, as little encumbered by foreign matter, or by idle tales, as poſſible: offering the chief ſpecimens of each kind, and enabling the reader to acquire a knowledge of moſt particulars which are intereſting. It was neceſſary in this intent to avoid the ſhackles of ſyſtem, yet, firmly adhering to order, to group what ſeemed allied, and to ſtate thoſe apparent relations which indicate ſimilarity, to avoid repetition and redundance, to aſſiſt the memory by conciſeneſs, perſpicuity, and relevancy.

Want of ſubject has been no difficulty, but to determine on a judicious ſelection, and to regulate their introduction,

has often been embarraſſing, and occupied much reflection. We preſume to think that no work of only equal bulk contains more information of general and familiar uſe, nor a completer or more compendious manual of natural knowledge: whether its merit be equal to the labour it has coſt, or its utility be equal to the wiſhes of its author, muſt now be ſubmitted to the determination of a candid and indulgent public; from whom, in the courſe of publication, we have received the moſt liberal teſtimony, and to whom we return our grateful acknowledgments, for numerous inſtances of approbation, and numerous marks of kindneſs and confidence.

CONTENTS

OF THE

SECOND VOLUME.

SURVEYS OF NATURE.

PART THE THIRD.

MAN the firſt in rank on the globe—variation—by climate—manners of life—cuſtoms—food—his original colour—of one original.

VARIETIES OF THE HUMAN SPECIES.

Laplanders, &c. page 1.—Tartars, &c. page 2.—Chineſe, &c. page 3.—Negroes, page 3.—Americans, page 3.—Europeans, page 4.

QUADRUPEDS.

	Page		Page
The HORSE	5	The *Mule*	9
The Ass	7	The ZEBRA	10

CONTENTS.

RUMINATING ANIMALS, page 12.

	Page
The Cow kind	13
The *Urus*	15
The *Biſon*	15
The BUFFALO	16
SHEEP and GOAT	18
Iceland Sheep	20
Broad-tailed Sheep	20
Strepſicheros	20
Guinea Sheep	20
The *Mouffion*	21
The GOAT	21
Angora Goat	22
Syrian Goat	22
American Goat	22
Cape of Good Hope Goat	23
Whida Goat	23
IBEX	23
CHAMOIS	23

GAZELLES, or ANTELOPES.

	Page
Twelve varieties	26-27
The BUBALUS	27
The CONDOMA	27
The GUIB	27
African wild Goat	27
CHEVROTIN	28

THE DEER KIND.

	Page
The Stag	28
Chineſe Stag	30
Corſican Stag	31
Tragelaphus	31
Axis	31
Mexican Stags	31
The FALLOW DEER	31
The ROE-BUCK	32
The ELK	34
The REIN-DEER	35
The MUSK ANIMAL	37
The CAMEL and DROMEDARY	39
The LAMA	41

THE HOG KIND.

	Page
The BOAR	43
The AFRICAN WILD BOAR	45
The PECCARY	46
The BABYROUESSA	48

THE DOG KIND.

	Age
The Dog	49
His varieties	51
The WOLF	54
Wolf of America	57
The Fox	58
His varieties	60
The JACKAL	60
The ISATIS	61
The HYENA	62

THE

CONTENTS.

THE CAT KIND.

	PAGE
The DOMESTIC CAT	64
Wild Cat	65
Its varieties	65
The LION	66
The TIGER	70
His varieties	71
The *Cougar*	72
The PANTHER	73
The LEOPARD	73
The JAGUAR	73
The OUNCE	74
The TIGER-CAT	4
The LYNX	75
The SYAGUSH	76
The SERVAL	76

THE WEASEL KIND.

	PAGE
The WEASEL	77
The ERMINE	78
The FERRET	79
The POLECAT	80
The MARTIN	81
The SABLE	12
The ICHNEUMON	83
The STINKARDS	84
The Squaſh	84
The Skunk	84
The Conepate	84
The Zorille	84
The GENETTE	85
The CIVET	86
The GLUTTON	87

THE HARE KIND.

	PAGE
The HARE	88
The RABBIT	90
The Syrian Rabbit	91
The MARMOTTE	92
The AGOUTI	94
The PACA	95
The GUINEA-PIG	96

	PAGE
The SQUIRREL	97
Its varieties	97
The *Flying Squirrel*	99

THE RAT KIND.

	PAGE
The great RAT	100
The black Rat	100
The black Water Rat	100
The MOUSE	101
The long-tail'd Field Mouſe	101
The Shrew Mouſe	101
The DORMOUSE	102
The MUSK RAT	102
The HAMSTER	103
The LEMING	104
The MOLE	105

THE PRICKLY KIND.

	PAGE
The HEDGE-HOG	107
The TANREC	108

	Page
The Tendrac -	108
The Porcupine -	109
The *Couando* -	110
The *Urſon* -	11

THE MONKEY KIND.

Apes.	Page
The Ouran Outang -	111
The *Pongo* -	113
The *Ape* -	113
The *long-armed Ape* -	113
The *Magot* -	113
Baboons.	
The Baboon -	113
The *Wanderow* -	114
The *Pigtail* -	114
Monkeys.	
The Ouarine -	115
African. *American.*	
Their varieties -	116
Sapajous -	117
Sagoins -	117

Mococos.

	Page
The Mococo -	118
The Mongooz -	118
The Vari -	119
The Lori -	119

Oppossums.

The Oppossum -	119
The Marmose -	120
The Cayopolin -	120
The Phalanger -	120
The Tarſier -	120

AMPHIBIOUS QUADRUPEDS.

	Page
The Otter -	121
The Beaver -	123
The Seal or Phoca -	125
The Morse -	126
The Manati -	126
The Hippopotamos -	127
The Tapiir -	128

SCALY and SHELLY QUADRUPEDS.

	Page
The Pangolin -	129
The Armadillo -	130
Its varieties -	134

QUADRUPEDS that will not range under any of the foregoing diviſions.

	Page
The Elephant -	132
The Rhinoceros -	135

The

CONTENTS.

	Page
The GIRAFFE, or CAMELOPARDALIS -	135
The BEAR -	136
Its varieties -	137
The RACOON -	138
The COATIMONDI -	139
ANT-EATERS Their varieties -	139
The SLOTH Its varieties -	140
The GERBOA -	141
The KANGAROO -	142
The BAT Its varieties -	144

SURVEYS OF NATURE.

PART THE FOURTH.

BIRDS.

THEIR external ſhape—their feathers—wings—manner of riſing—toes—bones—reſpiration—length of life—moulting—incubation—paſſage—varieties.——DISTINCTIONS, page 10.

	Page
THE EAGLE -	11
Its varieties -	12-13
The *King of the Vultures*	15
The VULTURE -	13
Its varieties -	14
The FALCON -	16
The gyr Falcon -	16
Falcon-gentle -	16

Other

CONTENTS.

	Page
Other varieties	16
The *Kite*	17
The Buzzard	17
Its varieties	17
The Butcher-Birds	Page
Their varieties	18
The OWL KIND.	Page
The *great* Horned Owl	19
The common Horned Owl	20
The Howlet	20
Varieties	20
The POULTRY KIND.	Page
The Bustard	21
Varieties	22
The Tinamous	23
The Turkey	23
The Peacock	24
The Hoccos	25
The Pheasant	26
Varieties	27
The Guinea Hen	28
The Cock	29
Varieties	30
The Cock of the Rocks	31
The Agami	31
The Grous	33
The *black Cock*	34
Varieties	34
Red Cock	34
The Partridge	34
Varieties	35
The Quail	36
Varieties	37
The PIE KIND.	Page
The Raven	38
The Crow	39
The Jackdaw	39
The Chough	40
The Rook	40
The Calaos	40
The Toucan	41
The Magpie	43
The *Chatterer*	44
The *Roller*	44
The Nutcracker	44
The WOODPECKERS.	Page
The green Woodpecker	45
The Creepers	46
The Hoopoes	47
The Promerops	47
The Bee-Eaters	47
The Fly-Catchers	48
The Ant-Eaters	48
Varieties	49
The Wry-Neck	49
The Anis	50
The Ox-Pecker	50
NESTS.	
Varieties	51

CONTENTS.

THE BIRD OF PARADISE.

PAGE

Varieties - - 52

THE CUCKOO.

PAGE

Varieties - - 53, 54

PARROTS.

PAGE

The COCKATOO - 55
PARROTS - 56
LORIES - 56
LONG-TAILED PARROQUETS 56
Short-tailed Parroquets - 57
MACKAWS - 57
AMAZONS - 57
CRIKS - 58

THE PIGEON.

PAGE

The STOCK-DOVE - 61
Domeſtic Pigeon - 61
The *Ring Dove* - 62
The *Turtle Dove* - 62
The *Peacock Pigeon* - 63
The Crown Fowl - 63

THE SPARROW KIND.

PAGE

The THRUSH - 65
The BLACK BIRD - 66
The BLUE BIRD - 66
The FIELD-FARE - 66
The STARLING - 66
The MOCK BIRD - 67
The MARTIN - 68
The NIGHTINGALE - 68
The RED-BREAST - 69
The BLUE-BREAST - 69
LARKS - 69
The BLACK-CAP - 70
The WREN - 70
The *Golden-creſted Wren* 70
The CANARY BIRDS - 70
The BULL-FINCH - 71
The GROS-BEAK - 72
The CROSS-BILL - 72

THE SWALLOW.

PAGE

The GOAT-SUCKER, or NIGHT-SWALLOW - 73
The HOUSE-SWALLOW - 74
The MARTIN - 74
The SWIFT - 74

THE HUMMING BIRDS.

PAGE

Varieties - 76

WATER BIRDS.

CRANES.

PAGE

The CRANE - 81

CONTENTS.

	Page
The Stork	83
Varieties	84
The Ibis	84
Variety	85
The Jabiru	85
The *Nandapoa*	68
The Kamichi	86
The Secretary	87
The Cariama	88
Crowned African Crane	89
Numidian Crane	90
Spoon-bill	90
Flamingo	91

	Page
The Heron	94
Varieties	95
The Open-bill	96
The Bittern	96
The Night-Raven	97
The Savacou	98
The Avocetta,	98

Small Birds of the Crane Kind.

	Page
Varieties	99, 100
The Woodcock	101
The Snipe	102
The Combatant	103
The Lapwing	103
The Oyster-catcher	104
The Turnstone	105
The Water-Ouzel	105
The Rails	106
The Jacana	107
The Porphyrion	107
The King-Fisher	108
The Water-Hen	109
The Coot	110

	Page
The Grebe	111
Varieties	
The Anhinga	112

	Page
The Pelican	112
The Cormorant	115
The Albatross	116
Gulls and Petrels	117
The Frigate Bird	117
The Boobies	118
The Gannet	120
The Noddy	121
Sea-Swallows	121
Tropic Birds	122

The PENGUIN KIND.

	Page
The Magellanic Penguin	124
The Auk	124
The Puffin	124
The Diver	125
Varieties	125
The *Goosander*	126

The GOOSE KIND.

	Page
The Swan	127
The Goose	128
Varieties	129

The

CONTENTS.

	Page
The Duck -	129
Varieties - -	130

BIRDS that will not range under any of the foregoing diviſions.

	Page
The Ostrich -	131
The Touyou -	133
The Cassowary -	135
The Dodo	

SURVEYS OF NATURE.

PART THE FIFTH.

OVIPAROUS QUADRUPEDS.

	Page
The Tortoise -	141
Land Tortoiſe -	143
Freſh-water Tortoiſe -	144
Sea Tortoiſes, or Turtle	145
Trunk Turtle -	148
Loggerhead Turtle -	148
Hawkſbill Turtle -	148
Mediterranean Turtle -	148

	Page
Lizards	149
The Crocodile -	150
The Whip-Tail -	154
The forked-tongued Lizard	155
The Iguana -	155
The Basilisk -	156
The Galeote -	157
The Grey Lizard -	157
The *Green Lizard* -	158
The Cameleon -	158
The Wood-slaver -	161
The Gecko -	161
The Seps -	163
The Chalcide -	163
The Dragon -	164
The Salamander -	164
The flat-tailed Salamander	165
The three-fingered Salamander	167

	Page
Oviparous Quadrupeds without Tails -	167
The Frog -	168
The Bull Frog -	172
Tree Frogs -	172
The Toad -	174
The brown Toad -	177
The Calamite -	177
The Pipal -	177

BIPED REPTILES.

	Page
The Fluted -	178
The Sheltopusick -	179

Of SERPENTS, P.	180
Their Diſtinctions -	186
Of *venomous Serpents* -	187

	Page
The Viper	189
The *Viper of Egypt*	191
The Ammodytes	191
The Cerastes	191
The Naja	192
The Yellow Serpent	193
The *Whip Snake*, &c.	195
The Snake	194
The *Black Snake*	195
The Ladies' Snake	195
The Daboie	196
The Boiguacu	197
The Rattle Snake	198
The Blind Worm	201
The Amphisbenæ	201

Of FISHES	Page 203
Cetaceous Fishes	208
The Whale	209
The Narwhal	214
The Cachalot	215
The Dolphin, Grampus and Porpesse	217

CARTILAGINOUS FISHES, Page 218

The Shark	219
The Ray kind	222
Skate	222
Ray	223
Rough Ray	223
Fire-flare	224
Torpedo	224
The Lamprey	225
The Sturgeon	226
Huso	228

Anomalous Cartilaginous Fishes.

The Mole	228
The Fishing Frog	229
The Lump Fish	229
The Sea Snail	229
The Pipe Fish	230
The Hippocampus	230
The Sea Orb	230
Varieties	230
The Galley	231

SPINOUS FISHES Page 231

The Salmon	233
The Eel	233
The Cod	234
The Haddock, Whiting, Mackarel	234
Herring	235
Pilchard	236
Stickleback	236
Dorado	238
Flying Fish	238
Pike	238

SHELL FISH.

The Lobster	240
The Crab	242
The *Land Crab*	243
The *Violet Crab*	243
The *Soldier Crab*	245
Testaceous Fishes and their Shells	245

	Page
Turbinated Shells -	248
The Snail -	248
Its Varieties -	249
The Trochus -	251
The Nautilus -	251

BIVALVE SHELLS.

	Page
The Muſſel -	253
The Oyſter -	254
The Scallop -	255
The Razor Shell -	256
Pearls - -	156

MULTIVALVE SHELLS.

	Page
The Sea Urchin -	257
Acorn, &c. -	257
Pholades -	258

PART the SIXTH.

INSECTS.

WINGLESS INSECTS, Page 263

The Spider -	264
Houſe Spider -	265
Garden Spider -	266
Water Spider -	267
Tarantula - -	268
The Flea -	268
The Louse -	269
The Leaf Louſe and Varieties	271
The Bug -	272
The Wood Louse -	273
The Monoculus -	274
The Scorpion -	274
The Scolopendra -	277
The Gally Worm -	277

INSECTS which acquire WINGS.

	Page
The Dragon Fly -	278
The Lion Ant -	280
The Grasshopper, *Locuſt*, *Cricket*, *Mole Cricket* -	282
The Earwig -	289
The Cuckow-Spit -	289
The Water Tipula -	290
Water Fly -	290
Water Scorpion -	290
The Ephemera -	290
CATERPILLARS, &c.	293
The Silk-Worm -	301
The Bee -	304
The Humble Bee -	309
The Wood Bee -	309
The Maſon Bee -	310
The Ground Bee -	310
The Leaf-cutting Bee -	310
The Wall Bee -	310
The Wasp -	311
The Solitary Waſp -	313
The Ichneumon Fly	314
The Ant -	315
African Ants -	317
BEETLES, &c.	318
The May Bug -	318
The Tumble Dung -	319
The Elephant Beetle -	319
The Glow Worm -	320

The

	Page
The Cantharis	320
The Kermes	321
The Cochineal	321
Gall Insects	322
The Gnat	322
The Tipula	322

WORMS and ZOOPHYTES.

	Page
The Leech	324
Worms	325
The Star Fish	327
The Cuttle Fish	328
The Polypus	328
Lithophytes and Sponge	331
Eels *in Paste*	333
Animalcula	334

Principles of Vegetation.

	Page
Propagation	339
Grafting	340
Seeds	341
Seminal Root	341
Roots	343
Bark	343
Trunk	345
Wood	346
Pith	346
Leaves	347
Flowers	347
Fruit (a Pear)	348
—— (a Lemon)	348
Sap	349
Nutriment	350
Irritability	352
Sensitive Plant	353
Parasitical Plants	353
Decayed Vegetables	354
Vegetation in the Water	354
Poisonous Plants	354
Edible Fruits	356
Grain	357

Classes of Plants according to the Sexual System. p. 358

Eight Plates to this Discourse. p. 359 to 363

ERRATA.——Vol. II.

Page 6, part 3, line 12, *for* find, *read* finds.
Page 45, line 21, *for* species, *read* kind.
Page 1, part 4, line 15, *for* quality, *read* faculty.
Page 142, Running Title, *for* Crustaceous Fishes, *read* Oviparous Quadrupeds.
Page 193, line 7, *for* speckled, *read* spectacled.
Page 286, line 17, for *dagnerous*, read *dangerous*.

SURVEYS OF NATURE.

PART THE THIRD.

IN conſidering the inhabitants of the globe, we muſt doubtleſs place MAN the firſt, in rank, and conſequence, if we regard merely the animal part of his compoſition, wherein, nevertheleſs, in common with animals of all kinds, he is ſubject to variations, ariſing from local circumſtances, climate, manner of life, cuſtoms, and nutriment; theſe variations are not ſo diſtinct, or indelible, as may induce us to diſallow one common origin; yet they are ſufficiently ſtriking, to juſtify particular notice. We proceed therefore to offer ſuch remarks as occur on this ſubject, and ſuch general information on the nature of animals, and their manners, as may juſtify our principles.

It ſhould ſeem, that, according to the rank of creatures in the ſcale of life, was their ſubjection to variation: thoſe of the lower degrees changing moſt from their priſtine ſtock, thoſe of greateſt fecundity changing ſomething at each generation, while creatures of greater bulk, longer life, or ſuperior faculties, leſs affected by theſe cauſes, maintained a nearer reſemblance to the forms, manners, and properties of their parental origin. According to this idea we may expect plants to vary greatly from ſimilar plants in their native climates (eſpecially in their powers), Inſects, Reptiles, ſmaller

Quadrupeds, and Birds; and this we find to be fact, not only in external appearance, but alſo in internal conformation, though the latter is noticed only by the curious—for inſtance, animals which with us have four ſtomachs, have in Africa only two; the reaſon we gueſs to be, becauſe the African graſs is more ſucculent, and ſooner gives out its nutritive particles than ours, conſequently requires leſs compreſſion, and preparation, which is the office of theſe ſtomachs. In external form, very ſtrange changes occur: fowls ſent from Europe to Virginia, quickly loſe their rumps, and by this loſs become as it were *metamorphoſed:* nor need we go ſo far for proofs; it is well known, our bull-dogs degenerate on the continent, and no art can maintain their race in perfection; ſo do our ſheep. If in the ſame latitudes this occurs, no wonder difference of latitude ſhould have great effect: creatures which require an ardent ſun muſt be very much enfeebled in northern climates. This is happy for us; eſpecially, if it be true, that we have in our own country moſt of thoſe venomous inſects (if not the reptiles) which beneath the Equator are ſo miſchievous, and deadly; but with us they are ſo weak and diminutive, that they require the microſcope to aſcertain them. Our ſnakes are doubtleſs of the ſame nature as equatorial ſerpents, but of how different powers! how feeble their hiſs! how diminiſhed their terrors! Larger animals (as the horſe) preſerve more of their native properties, and manners, though they vary in ſize and ſtrength; but no creature is capable of inhabiting the globe at large, of occupying diſtant and contradictory climates, like man, who

African.

who every where maintains his erect figure, his commanding aſpect, and his dominion over all creatures around his habitation; thoſe he ſelects for ſervice he domeſticates; thoſe he chaſes fly before him, dreading his power, and expelled (more or leſs) by his enmity. Even monſters of the deep, which in their profound receſſes might expect ſecurity, even theſe yield to his arts, and, diſturbed in their retreats, ſeek other ſhores, where to attain maturity. Thus the whale is no longer of the amazing dimenſions he once was, or if he reach them, it is diſtant from where the prow of navigation moleſts his repoſe.

If then man be leaſt ſubject to changes, yet we find in the human race conſiderable varieties: we may juſtly infer very great diverſity among animals of the ſame tribe; their reſemblances are leſs marked, and their approaches to other ſpecies nearer and more frequent: we ſhall however chiefly advert to the differences among mankind, and leave the inference to reflection and good ſenſe.

We have ſuggeſted as the cauſes of variety among the human ſpecies, climate, manner of life, cuſtoms, and nutriment; we conclude that theſe are the principal cauſes of this variety, becauſe if theſe be changed the effect changes alſo.

CLIMATE is not only, in general, hot or cold, moiſt or dry, but in ſome places in the ſame countries, hotter or colder, moiſter or drier, than in others. Upon mountains, in valleys, the action of the ſun differs; conſequently heat differs alſo. Around lakes and marſhes, by the ſides of great rivers, we expect ſuperabundant humidity, more watery air is breathed (acting

(acting internally), or affects the ſkin, the hair, &c. (acting externally); mineral particles alſo impregnate the air, and have conſequent influence not only on health, but on appearance.—This cauſe might be traced *ad infinitum*.

MANNERS OF LIFE vary ſo greatly among mankind, that much muſt be attributed to them. Cleanlineſs permits free perſpiration, and a clear ſkin; upon this Europeans value themſelves; while Hottentots clothe themſelves in greaſe, and of tawny make ſoot-black complexions. Thoſe always in ſmoke muſt needs be ſmoke-dried; thoſe always ſedentary feeble and inactive, thoſe always ſcorched by the ſun ſhrivelled, thoſe expoſed to the ſeaſons weather-beaten; theſe effects are ſo evident in the various claſſes of people which compoſe our own nation, that little imagination is neceſſary, to allow their full force among thoſe tribes of mankind whoſe days are paſſed in conſtant ſubjection to any one of them.

CUSTOMS and MANNERS follow cloſely on modes of life: what was at firſt arbitrary becomes at length national, what has been eſteemed a beauty determines the wiſhes of all, and by degrees their features; the power of imagination is not eaſily calculated. Religious rites, tyrannical impoſition, local diſeaſes, conſtant depreſſion of mind, ſuperſtition (which is always gloomy) and other habitual manners, greatly influence the expreſſion of the countenance.

FOOD, above all, is the cauſe of variety, by its *quantity* or its *quality*. If little and ill ſupplied, can it afford nutriment adequate to the conſumption of the body? Can it fill the parts, and furniſh throughout the whole, thoſe juices requiſite

to general increaſe? If now enjoyed in abundance, is there no danger of indiſpoſition by repletion? If now withheld, is not weakneſs and debility likely to enſue? The *quality* of food is confeſſedly different, as well animal as vegetable: if coarſe and refuſe, or in good condition; if juicy, or dry in its nature; if freſh, or preſerved by artificial means, ſalt, or ſmoke, correſpondent effects on thoſe who live on it may naturally be expected. And to this muſt be added, the very great variety of liquors, fermented or ſimple, water, milk, beer, wine, ſap of trees, ſpirits from corn, rice, vinous fermentations, and what anſwers the ſame end, opium. Theſe are many of them daily noticed by us, and from what we actually ſee, we may readily conclude their influence elſewhere.

Theſe cauſes branch out into almoſt innumerable effects; and vary in the ſame kingdom, or country. To trace them further is rather the province of the Geographer than the Naturaliſt; though it muſt be owned that whatever concerns our race, intereſts ſomething in us ſuperior to curioſity.

What was the *original* COLOUR of mankind, has long divided the learned. Upon the whole, I acquieſce in the opinion that the lighter Aſiatics are the neareſt to it; for in our own country, which ſtands firſt in fairneſs of complexion, the tints of thoſe among us expoſed to the air, &c. are little different from many Aſiatics. That expoſure to air is our natural ſtate, I am perſuaded: and thus circumſtanced, the cleareſt ſkin acquires a tint of *brunette*. The deviation of colour has been toward fairneſs in Europe,—towards blackneſs in Africa. Not but that the upper ſkin of a Negro is colourleſs as our own;

(acting internally), or affects the ſkin, the hair, &c. (acting externally); mineral particles alſo impregnate the air, and have conſequent influence not only on health, but on appearance.—This cauſe might be traced *ad infinitum.*

MANNERS OF LIFE vary ſo greatly among mankind, that much muſt be attributed to them. Cleanlineſs permits free perſpiration, and a clear ſkin; upon this Europeans value themſelves; while Hottentots clothe themſelves in greaſe, and of tawny make ſoot-black complexions. Thoſe always in ſmoke muſt needs be ſmoke-dried, thoſe always ſedentary feeble and inactive, thoſe always ſcorched by the ſun ſhrivelled, thoſe expoſed to the ſeaſons weather-beaten; theſe effects are ſo evident in the various claſſes of people which compoſe our own nation, that little imagination is neceſſary, to allow their full force among thoſe tribes of mankind whoſe days are paſſed in conſtant ſubjection to any one of them.

CUSTOMS and MANNERS follow cloſely on modes of life: what was at firſt arbitrary becomes at length national, what has been eſteemed a beauty determines the wiſhes of all, and by degrees their features; the power of imagination is not eaſily calculated. Religious rites, tyrannical impoſition, local diſeaſes, conſtant depreſſion of mind, ſuperſtition (which is always gloomy) and other habitual manners, greatly influence the expreſſion of the countenance.

FOOD, above all, is the cauſe of variety, by its *quantity* or its *quality*. If little and ill ſupplied, can it afford nutriment adequate to the conſumption of the body? Can it fill the parts, and furniſh throughout the whole, thoſe juices requiſite

to general increaſe? If now enjoyed in abundance, is there no danger of indiſpoſition by repletion? If now withheld, is not weakneſs and debility likely to enſue? The *quality* of food is confeſſedly different, as well animal as vegetable: if coarſe and refuſe, or in good condition; if juicy, or dry in its nature; if freſh, or preſerved by artificial means, ſalt, or ſmoke, correſpondent effects on thoſe who live on it may naturally be expected. And to this muſt be added, the very great variety of liquors, fermented or ſimple, water, milk, beer, wine, ſap of trees, ſpirits from corn, rice, vinous fermentations, and what anſwers the ſame end, opium. Theſe are many of them daily noticed by us, and from what we actually ſee, we may readily conclude their influence elſewhere.

Theſe cauſes branch out into almoſt innumerable effects; and vary in the ſame kingdom, or country. To trace them further is rather the province of the Geographer than the Naturaliſt; though it muſt be owned that whatever concerns our race, intereſts ſomething in us ſuperior to curioſity.

What was the *original* COLOUR of mankind, has long divided the learned. Upon the whole, I acquieſce in the opinion that the lighter Aſiatics are the neareſt to it; for in our own country, which ſtands firſt in fairneſs of complexion, the tints of thoſe among us expoſed to the air, &c. are little different from many Aſiatics. That expoſure to air is our natural ſtate, I am perſuaded: and thus circumſtanced, the cleareſt ſkin acquires a tint of *brunette*. The deviation of colour has been toward fairneſs in Europe,—towards blackneſs in Africa. Not but that the upper ſkin of a Negro is colourleſs as our own;

own: the ſeat of blackneſs is ſaid to be the reticular membrane, between the ſkins; and this tint probably ariſes from ſome ſecretion thrown more plentifully on that part by the heat of the country, and coloured by heat, by exhalations from minerals and vegetables, and by vapours of various kinds, not omitting the dry and ſultry winds of Africa.

We conclude theſe introductory remarks, by obſerving the wiſdom evident in diſpoſing each nation of men to think highly of their own country, notwithſtanding the inconveniencies apparent to ſtrangers. The African enjoys his heat, the Laplander his cold, the Aſiatic his indolence, the European his activity. Each find a ſomething peculiarly agreeable in his native climate, and is condemned by his own mouth if ungrateful to the univerſal Benefactor: nor is it leſs proper that each ſhould admire his national complexion, ſhould depict beauty as charming black, and feel the ſhafts of love ſhot from delightful jet; or engage roſes and lilies in feeble compariſon with the object of admiration, and deſcribe her complexion as *whiter* than ſnow. Were it otherwiſe, and that our native land diſpleaſed us, we ſhould ſeek foreign ſhores, and encounter thouſands of uſeleſs perils, and unprofitable difficulties: we ſhould mingle, without benefit, the tawny with the fair, the light with the duſky, the white with the black, which though it *may* be done, and thereby proves the common nature and common origin of mankind, yet ſeems to promiſe little happineſs and comfort, little pleaſure and ſolace, little domeſtic ſatisfaction, and perſonal enjoyment: without which, what is climate, complexion, manners, or even life itſelf!

Laplander.

VARIETIES

OF THE

HUMAN SPECIES.

THERE ſeem to be about ſix varieties in the human ſpecies, each ſtrongly marked, and indicating little mixture.

The firſt around the polar regions. The Laplanders, the Eſquimaux Indians, the Samoeid Tartars, the inhabitants of Nova Zembla, the Borandians, the Greenlanders, and Kamſkatkadales, may be conſidered as one race of people, reſembling each other in ſtature, complexion, and cuſtoms. Under a rigorous climate, of few productions, and coarſe proviſions and ſcanty, their bodies have been ſtinted, and their complexions changed, by cold, to a deep brown, often inclining to blackneſs. Theſe people, in general, are of ſhort ſtature, and odd ſhape, with countenances ſavage, and manners barbarous. Their viſage is large and broad, the noſe flat and ſhort, the eyes yelloviſh brown inclining to black, the eye-lids drawn toward the temples, the cheek-bones extremely high, the mouth very large, the lips thick and turned outwards, the voice thin and ſqueaking, the head large, the hair black and ſtraight, the colour of the ſkin dark greyiſh. The generality are about four feet high, the talleſt five. The women reſemble the men ſo nearly that one cannot, at firſt, diſtinguiſh the ſexes.

Stupidity, ſuperſtition, and cowardice, belong equally to theſe people: yet they are dexterous in ſkaiting, in conſtructing their ſledges, wherein they are drawn over the ſnow, in the uſe of the bow, and the dart, in the management of their rein-deer; and thoſe near the coaſt, in fiſhing. They have few wants, which they eaſily ſupply, and *Linnæus* ſays they have more content and enjoyment than nations which eſteem them barbarous; and which in return they do not heſitate to contemn as ill-bred and unpolite.

They are all hunters, and purſue the ermine, the fox, the ounce, and the martin, for their ſkins. Theſe they barter, with their ſouthern neighbours, for brandy and tobacco; of both which they are fond to exceſs. Their food is principally dried fiſh, the fleſh of rein-deer and of bears. Their bread is bones of fiſhes pounded, mixed with the inner bark of the pine tree. Their drink is train-oil, or brandy; when deprived of theſe, water, in which juniper berries have been infuſed.

The ſecond great variety, in the human ſpecies, is the Tartar race; whoſe country comprehends great part of Aſia; conſequently, includes a number of nations, of various forms and complexions. But, however different from each other, they agree in being unlike any other people. Theſe have the upper part of the viſage very broad, and wrinkled even in youth; their noſes ſhort and flat, their eyes little and ſunk in their heads; in ſome of them, five or ſix inches aſunder; their cheek-bones high, the lower part of the viſage narrow, the chin long and prominent, their teeth large and apart, their eye-brows thick, and hanging, their eye-lids thick, the face broad and flat, the complexion olive, and hair black. They are of a middle ſize, extremely ſtrong and robuſt. They have little beard, ſtraggling on the chin. They have large thighs, and ſhort legs. The uglieſt are the Calmoucks, whoſe appearance is frightful. They lead an erratic life, dwelling in tents of hair, or ſkins. They live upon fleſh of horſes or camels, raw, or ſodden between the horſe and the ſaddle; alſo fiſh dried in the ſun. Their uſual drink is mare's milk, fermented with millet ground into meal. They ſhave the head, except a lock of hair, on the top, which they form into treſſes, on each ſide the face. The women, counterparts to the men, wear their hair, which they ornament with bits of copper and other finery.

Irreligious, immoral, indecent, diſhoneſt, and filthy, for the moſt part characterizes theſe nations: yet among them are exceptions: but all are dexterous at plunder, traffic in ſlaves, can endure great hardſhips, and travel long without reſt: are very fond of horſes, and expert in their management: receive from this animal clothing and food.

To this race is referred the Chineſe and the Japaneſe, however different they ſeem. The Chineſe have broad faces, ſmall eyes, flat noſes, and ſcarce any beard; are broad and ſquare-ſhouldered, and rather leſs in ſtature than Europeans. Theſe are marks common to them and the Tartars.

Chineſe.

Hottentots.

North American.

The Japaneſe reſemble the Chineſe, and rank in the ſame claſs. They differ in being rather browner, as they inhabit a more ſouthern climate.

A third variety in the human ſpecies, is the ſouthern Aſiatics. The nations of the Peninſular India, ſeem to be the ſtock whence the iſlands ſcattered in the Indian ocean, have been peopled. They are, in general, of a ſlender ſhape, with long ſtraight black hair, and often Roman noſes. Thus they reſemble Europeans in ſtature and features; but greatly differ in colour, and habit of body. The Indians are of an olive colour, in the more ſouthern parts, quite black; the women are extremely delicate. The Indians are cowardly and effeminate; the warmth of their climate influences their manners; ſlothful, ſubmiſſive, luxurious; ſatisfied with ſenſual happineſs without mental pleaſure; contented with ſlavery, they readily obey any maſter. Many tribes among them eat nothing that has life; but are fearful of killing the meaneſt inſect. To this claſs we may refer the Perſians and Arabians.

The fourth variety in the human ſpecies, is the Negroes, which blacken the ſouthern parts of Africa, from 18 degrees north to the Cape of Good Hope. The Caffres, indeed, who inhabit the ſouthern extremity of that large continent, differ ſomewhat in colour and features, but may be grouped together. Negro nations alſo differ: peculiar countries, as in Europe, pride themſelves on their beauty. Thoſe of Guinea are ugly, and of ill ſcent; thoſe of Moſambique are reckoned beautiful, and have no ill ſmell. Negroes, in general, are of a black colour, with a ſoft ſmooth ſkin, proceeding from the downy ſoftneſs of the hair growing on it. The hair of their heads is ſoft, woolly, and ſhort. The beard, alſo, partakes of the ſame qualities; but ſoon turns grey, which the hair rarely does; ſo that white beards, and black hair occur together. Their eyes are generally a deep hazle; their noſes flat and ſhort; their lips thick and tumid; their teeth of ivory whiteneſs. The climate ſeems alſo to relax their mental powers; they are, in general, ſtupid, indolent, and miſchievous. The many colonies of Arabians who migrated ſouth into Africa, have become ſcarce diſtinguiſhable from the original natives. As alſo the Portugueſe, who, about two centuries ago, ſettled along this coaſt, are become almoſt as black as the Negroes, and equally barbarous.

A fifth race, different in colour, as diſtinct in habitation, is the natives of America (except in the northern extremity, where they reſemble the Laplanders): theſe are of a red or copper colour; nearly all of one colour; have black, thick, ſtrait hair; and thin black beards; which they

pluck out by the roots. They have, in general, flat noſes, high cheek-bones, and ſmall eyes; and theſe deformities they increaſe by art. They paint the body and face of various colours, and conſider hair, except upon the head, as a deformity to be eradicated. Their limbs are generally ſlighter than thoſe of Europeans. Their frequent wants make them ſurpriſingly patient; diſtreſs by familiarity becomes leſs terrible; they poſſeſs rather apathy than fortitude. They have a ſerious air, but ſeldom think; are improvident; but though indolent, capable of great exertions. They live by the chace; are cruel to their enemies, but kind and juſt to each other.

The ſixth variety of the human ſpecies, is the Europeans, and bordering nations, including the Georgians, Circaſſians, and Mingrelians, the inhabitants of Aſia Minor, and the northern parts of Africa, with part of the countries north-weſt of the Caſpian ſea. Theſe differ much, but generally agree in the colour of their bodies, their complexions, their largeneſs of limbs, and vigour of underſtanding. It is natural to ſuppoſe, that ſome intermixtures muſt have taken place, even among the moſt ſecluded nations; viſitants, whether friends or foes; ſome traffic, though but little, and ſome removes, though ſeldom, muſt have had their effect. Hence mixtures, and hence thoſe leſſer branches, which poſſeſs not ſolely the likeneſs of any unmingled race.

THE

QUADRUPEDS.

THE HORSE.

OF all quadrupeds, the horſe is moſt beautiful; his noble form, his gloſſy ſmoothneſs of ſkin, his graceful eaſe of motion, and exact ſymmetry of ſhape, have induced us to regard him as the firſt of animals, and as the moſt perfectly formed; yet, his internal ſtructure differs more from the human than that of all other quadrupeds.

The horſe, like other animals, is naturally wild, and domeſticated by the art of man; his enemies of the foreſt are but few, none but the greater kinds will venture to attack him; theſe he is able to overcome ſingly, but is content to find ſafety in ſociety; wild horſes herding together, often in droves of five or ſix hundred. As they are never attacked but at a diſadvantage, when they ſleep in the foreſts, one among their number ſtands as centinel, and this office they take by turns. If a man approaches them while feeding by day, the centinel walks boldly near him, as if to examine, or to intimidate him; as the man approaches within piſtol ſhot, the centinel alarms his fellows, by a loud kind of ſnorting, upon which all fly off with the ſpeed of the wind; their faithful centinel bringing up the rear. They will not admit of ſtrange animals among them, even of their own kind. If a tame horſe attempts to aſſociate with them, they ſoon oblige him to ſeek ſafety by flight.

Arabia produces the moſt beautiful breed of native horſes, the moſt generous, ſwift and perſevering. They are found wild, though not in great numbers, in the deſarts of that country; and the natives uſe every ſtratagem to take them. They are active and beautiful, yet not ſo large as thoſe bred up tame; are of a brown colour; their mane and tail very ſhort, and the hair black and tufted. Their ſwiftneſs is incredible; to purſue them with dogs is fruitleſs. By their rapid flight, they are inſtantly out of view, and dogs themſelves give up the purſuit. They are taken by traps, hidden in the ſand, which entangle their feet. If the horſe thus caught be young, he is conſidered as a great delicacy, and affords a feaſt; but if he promiſes to be ſerviceable in his nobler capacity, he is tamed by the uſual methods, fatigue and hunger, and ſoon becomes an uſeful domeſtic.

The

The manner of trying their ſpeed is by hunting the oſtrich: the horſe is the only animal whoſe rapidity equals that of this creature, which inhabits the ſandy plains of thoſe countries. When the oſtrich perceives itſelf aimed at, it makes to the mountains, while the horſeman purſuing with all poſſible ſwiftneſs, endeavours to cut off its retreat. The chace then continues along the plain, the oſtrich uſing both legs and wings to aſſiſt its motion; only a horſe of the firſt ſpeed is able to outrun it: and if, in a trial of this kind, he is not readily tired, his price becomes proportionably great; ſome horſes are valued at a thouſand ducats. Horſes thus caught, or thus trained, are at preſent rare.

The Arabians preſerve pedigrees of their horſes with great care, for ages. They know their alliances and genealogies; they diſtinguiſh their races by different names, and divide them into three claſſes. I. The nobles, the ancient breed, unadulterated on either ſide. II. The horſes of the ancient race, but adulterated. III. Thoſe common and inferior. They know, by experience, the race of a horſe by his appearance; and can tell the name, the ſurname, the colour, and the marks properly belonging to each. The moſt ordinary mare of the firſt race ſells for 500 crowns; many for 1000, and ſome for 14 or 1500l. As the Arabians live in tents, they alſo ſerve them for ſtables; ſo that the mare, the foal, the huſband, the wife, the children, lie together indiſcriminately; the little children are often aſtride on the body, or neck of the mare, which permits their careſſes without injury. The Arabians never beat their horſes, but treat them gently; ſpeak to them, and ſeem to diſcourſe with them as friends; never attempt to increaſe their ſpeed by the whip, or ſpur them but in caſes of neceſſity. When thus urged, they ſet off with amazing ſwiftneſs; they leap over obſtacles with as much agility as a buck; and, if the rider happens to fall, are ſo manageable, that they ſtand ſtill in the midſt of their moſt rapid career. The Arabian horſes are of a middle ſize, eaſy in their motions, and rather inclined to leanneſs than fat. They eat nothing during the day; only drink once or twice; at ſun-ſet a bag is hung to their head, containing about half a buſhel of clean barley, which they eat during night. When the ſpring is paſt, they are taken from paſture, and barley is their only food during the reſt of the year, except now and then a little ſtraw. They are always kept ready ſaddled at the tent door from morning till ſun-ſet, in order to be prepared againſt ſurpriſe.

From Arabia the moſt generous race of horſes has been tranſmitted to many parts of the world, to Egypt, to Barbary among the Moors, and

and from them into moſt parts of Africa. Europe alſo, and even America, highly prize Arabian horſes. America had not originally this noble animal; but now has plenty, not only domeſtic, but wild alſo. At this time, almoſt all nations have their reſpective breeds of horſes, and according to their ſoil, climate, or management, the animal improves or degenerates.

By great aſſiduity, application, and management in their breeding, Engliſh horſes are now ſuperior to all others for ſize, ſtrength, ſwiftneſs, and beauty. By judicious mixture of foreign original kinds, the happy difference of our ſoils, and our ſuperior ſkill, we have brought this animal to its higheſt perfection. An Engliſh horſe excels the Arabian, in ſize and ſwiftneſs; is more durable than the Barb, and more hardy than the Perſian. Our racers go at the rate of a mile in two minutes: and we had one inſtance, in the admirable Childers, of ſtill greater rapidity. He has been frequently known to move above eighty-two feet and a half in a ſecond, or almoſt a mile in a minute: and he has run round the courſe of Newmarket, which is little leſs than four miles, in ſix minutes and forty ſeconds.

THE ASS.

THE horſe and the aſs, though nearly approaching in form, are of diſtinct kinds, and of different natures: were there but one of each kind, both races would probably be extinguiſhed. Their ſhapes and habits may reſemble; but there is ſomething in every animal, beſide conformation, or way of life, that determines its ſpecific nature.

The onager, or wild aſs, abounds more than the wild horſe; and the peculiarities of its kind are more diſtinctly marked than among the tame. Had it been a horſe degenerated, or were a horſe an aſs improved, the wild animals of both kinds would reſemble each other, much more than thoſe domeſticated, on whom art has long been employed in producing new habits and alterations. The contrary however obtains, and the wild aſs is even more *aſinine*, than that bred in ſervitude; and has a natural averſion to the horſe.

This animal is found wild in many iſlands of the Archipelago, particularly in that of Cerigo: alſo in the deſarts of Lybia and

Numidia: they run with ſuch amazing ſwiftneſs, ſcarce even the courſers of the country can overtake them. When they ſee a man, they ſet up a horrid braying, and ſtop ſhort all together, till he approaches near them; then fly off with great ſpeed; and on ſuch occaſions generally fall into traps which are previouſly prepared. The natives take them chiefly on account of their fleſh, which they eſteem delicious eating; and for their ſkins, of which that kind of leather is made which is called ſhagreen.

The aſs was originally imported into America by the Spaniards. That country ſeems to have been peculiarly favourable to this race of animals; and, where they have run wild, they have multiplied in ſuch numbers, that in ſome places they are become a nuiſance. They have the ſwiftneſs of horſes; neither declivities nor precipices retard their career. When attacked, they defend themſelves with their heels and mouth with ſuch activity, that, without ſlackening their pace, they often maim their purſuers. But the moſt remarkable property in theſe creatures is, that after carrying their firſt load, their celerity leaves them, their dangerous ferocity is loſt, and they ſoon contract the ſtupid look and dulneſs peculiar to their ſpecies. It is alſo obſervable, that theſe creatures will not permit a horſe to live among them. They always feed together; and if a horſe happens to ſtray where they graze, without giving him the liberty of flying, they bite and kick him till they leave him dead on the ſpot.

But the aſs, in a ſtate of tameneſs, is the moſt gentle and quiet of animals. He ſuffers, without reſiſtance, the ill treatment of his owners: he is temperate with regard to the quantity and quality of his proviſion; and makes his humble repaſt on what the horſe and other animals leave behind: he prefers the plantane among herbs; is delicate with reſpect to his water; drinks only at the cleareſt brooks, and chiefly thoſe to which he has been accuſtomed. He drinks as ſoberly as he eats; and never, like the horſe, dips his noſe into the ſtream: he never rolls, like the horſe, in the mud; he even fears to wet his feet; and turns out of his way to avoid dirt.

When over-loaded, the aſs hangs down his head, and lowers his ears; when too hard preſſed, opens his mouth, and draws back his lips in a very diſagreeable manner. If his eyes are covered he will not ſtir a ſtep; if he is laid down in ſuch a manner that one eye is covered with the graſs while the other is hidden with a ſtone, or whatever is next at hand, he continues in the ſame ſituation, and will not

attempt to riſe to free himſelf from thoſe ſlight impediments. He walks, trots, and gallops like a horſe; but though he ſets out very freely at firſt, yet is ſoon tired; and no beating will make him mend his pace.

We have good reaſons to believe that, were the ſame care beſtowed on the aſs as on the horſe, and the ſame induſtry uſed in croſſing the breed and improving it, we ſhould ſee the aſs become from his preſent mean ſtate, a very portly and ſerviceable animal; we ſhould find him rival the horſe in ſome of his perfections, and exceed him in others. The aſs, bulk for bulk, is ſtronger than the horſe; is more ſure-footed; and, though ſlower in his motions, is much leſs apt to ſtart out of the way.

Though now common in England, the aſs was loſt among us during the reign of Queen Elizabeth. Holingſhed informs us that our land did yield no aſſes: but we have accounts of their being frequent in England before that time. In Sweden and the north, they are a ſort of rarity. The hotter climates are the original of this ſerviceable creature. In Guinea, they are larger and more beautiful than their horſes. In Perſia, they have two kinds; one uſed for burthens, being ſlow and heavy; the other for the ſaddle, being ſmooth, ſtately, and nimble. They are managed as horſes, and they are taught to amble like them; but the rider ſits nearer the crupper. They generally cleave their noſtrils to give them more room for breathing, and many of theſe are ſold for forty or fifty pounds.

Of all animals covered with hair, the aſs is the leaſt ſubject to vermin, for he has no lice, probably owing to the dryneſs and hardneſs of his ſkin: he is three or four years in coming to perfection; lives till twenty or twenty-five; ſleeps much leſs than the horſe; never lies down for that purpoſe, unleſs very much tired. The ſhe-aſs goes above eleven months with young; never brings more than one at a time.

The Mule may be engendered either between a horſe and a ſhe-aſs, or between a jack-aſs and a mare. The latter breed is larger, ſtronger, and better ſhaped. The common mule is healthy, and will live above thirty years, being very ſerviceable in carrying burthens, particularly in mountainous and ſtony places, where horſes are not ſo ſure-footed. The mule is not totally and neceſſarily barren: beſide the authority of Ariſtotle long ago, modern obſervation furniſhes facts in proof of this aſſertion; but as the inſtances are very rare, the mule may be conſi-

dered as an animal generally barren, conſequently, contrary to the order of nature, who has confined fertility within certain bounds, that intermixture of ſpecies might not prevail, nor inſtead of regular deſcendants, broods of miſhapen forms and manners.

THE ZEBRA

IS chiefly a native of the ſouthern parts of Africa; whole herds of them feed in thoſe extenſive plains that lie towards the Cape of Good Hope. By their watchfulneſs they ſuffer nothing to come near them; and by their ſwiftneſs, they leave every purſuer far behind. The zebra, in ſhape, reſembles the mule rather than the horſe, or the aſs; is rather leſs than the former, yet larger than the latter; its ears not ſo long as the aſs, nor ſo ſmall as the horſe. Like the aſs, its head is large, its back ſtraight, its legs finely placed, and its tail tufted at the end; like the horſe, its ſkin is ſmooth and cloſe, its hind quarters round and fleſhy. But the amazing regularity and elegance of its colours is its greateſt beauty. In the male, they are white and brown; in the female, white and black, diſpoſed in alternate ſtripes over the whole body, like ſo many ribbands, narrow, parallel, and exactly ſeparated from each other; every ſtripe is perfectly diſtinct, and preſerves its colour round the body (or the limb) without diminution. The head, body, thighs, legs, tail, and ears, are thus beautifully ſtreaked.

The head of the male zebra is ſtriped with bands of black and white, which center in the forehead. The ears variegated with white and duſky brown. The neck has broad ſtripes of the ſame dark brown running round it, leaving narrow white ſtripes between. The body is ſtriped acroſs the back with broad bands, leaving narrower ſpaces of white between them, ending in points at the ſides of the belly, which is white, except a black line pectinated on each ſide, from between the fore-legs, along the middle of the belly, two thirds of its length. There is a line of ſeparation between the trunk of the body and the hinder quarters, on each ſide; behind which, on the rump, is a plat of narrow ſtripes, joined together, by a ſtripe down the middle, to the end of the tail. The colours differ in the female; the ſtripes vary ſometimes, but are always equally diſtinct; the hair equally ſmooth and

and fine; the white ſhining and unmixed; and the black, or brown, thick, and luſtrous.

Such is the beauty of this creature, by nature ſeemingly fitted for the pleaſure and ſervice of man. Hitherto, however, it has diſdained ſervitude, and neither force nor kindneſs has ſubdued its native independence and ferocity. Yet probably this animal, by time and aſſiduity, might be brought under ſubjection. As it reſembles the horſe in form, without doubt it has a ſimilitude of nature, and only requires the efforts of an induſtrious and ſkilful nation, to be added to the number of our domeſtics. Nor is its extraordinary beauty the only motive for wiſhing this animal among our dependents: its ſwiftneſs is ſaid to ſurpaſs that of all others; ſo that the ſpeed of a zebra is become a proverb among the Spaniards and Portugueſe. It ſtands better upon its legs alſo than a horſe; and is conſequently ſtronger in proportion.

The zebra is chiefly a native of the Cape of Good Hope. It is alſo found in the kingdom of Angola; and, as we are aſſured by Lopez, in ſeveral provinces alſo of Barbary.

This animal, which is peculiar to Africa, is eaſily fed. That which came over into England ſome years ago, would eat almoſt any thing, bread, meat, tobacco, or hay. As it ſo nearly reſembles the horſe and the aſs in ſtructure, it probably brings forth annually as they do. Their noiſe is neither like that of a horſe nor an aſs, but more reſembling the confuſed barking of a maſtiff dog. In ſome the ſkin hangs looſe upon the neck, in a kind of dewlap, which takes away much from their general beauty.

OF

RUMINATING ANIMALS.

ANIMALS that chew the cud are moſt harmleſs, and moſt eaſily tamed. As they live on vegetables, they ſeldom deſire to change their paſtures, while furniſhed with a proper ſupply of food; and fearing nothing from each other, they generally go in herds for mutual ſecurity. The fierceſt of the carnivorous kinds ſeek their prey in ſolitude; theſe, on the contrary, range together, and unite in mutual defence; the hare itſelf is gregarious, in countries where it has no enemies but the beaſts of the foreſt.

Ruminant animals ſeem naturally more indolent and leſs artful than the carnivorous; their appetites more ſimple, and their inſtincts more confined. As it requires a tedious proceſs to tranſmute graſs into fleſh, Nature has, generally, furniſhed graſs-eaters with four ſtomachs, through which the food ſucceſſively paſſes, to undergo the proper ſeparations.

I. The paunch, which receives the food after a ſlight chewing. II. The honeycomb, properly a continuation of the former. Theſe two, which are very capacious, the animal fills as faſt as it can, then lies down to ruminate, which is a kind of vomiting without effort or pain. The food, by chewing a ſecond time, is rendered more ſoft and moiſt, and at laſt liquid enough to paſs into the third ſtomach, where it undergoes ſtill farther comminution. In this ſtomach, called the manyfold, from the number of its leaves (all which promote digeſtion), the graſs appears like boiled ſpinage: in the fourth ſtomach, it is completely macerated, and ready to be turned into chyle.

The ſtomach of ruminant animals is ſtrong and muſcular, the more readily to act on its contents; their inteſtines fat, the better to preſerve their warmth; and extended to a great length, ſo as to extract the whole nouriſhment which their vegetable food ſupplies.

The cow, the ſheep, and the deer being furniſhed with four ſtomachs, may properly be called the ruminant kinds; though many others have

have this quality in a ſmall degree. Among animals, the rhinoceros, camel, horſe, rabbit, marmotte, and ſquirrel. Among birds, the pelican, ſtork, heron, pigeon, and turtle, have a power of diſgorging their food (chiefly to feed their young). Among fiſhes, lobſters, crabs, and one or two others. Among inſects, the mole, cricket, waſp, drone, bee, graſhopper, and beetle. All theſe animals either actually or *ſeemingly* chew the cud. Their ſtomachs are compoſed of muſcular fibres, by means whereof their food is ground up and down, in the ſame manner as in thoſe diſtinguiſhed by the appellation of ruminants.

OF THE

COW KIND.

OF all ruminant animals, thoſe of the cow kind deſerve the firſt rank, for their ſize, their beauty, and their ſervices.

The climate and paſture of Great Britain are excellently adapted to this animal's moderate nature; our verdant and fertile plains perfectly ſuit its manner of feeding; for wanting the upper fore teeth, it loves to graze in a high rich paſture, little regarding the quality of its food, if ſupplied in abundance. In no part of Europe the tame animal grows larger, yields more milk, or more readily fattens, than with us.

Our paſtures ſupply them with plenty; they in return enrich the paſture; for of all animals, the cow ſeems to give back more than it takes from the ſoil.

This animal is furniſhed with eight cutting teeth in the lower jaw; at the age of ten months, the two middlemoſt fall out, and are replaced by others not ſo white, but broader; at ſixteen months, the two next milk-white teeth fall out, and others appear: thus changing every ſix months, till all the cutting teeth are renewed, which then are long, pretty white and equal; but as the animal advances in years, they become irregular and black, their inequalities ſmoother, and the animal leſs capable of chewing its food. The cow often declines from this cauſe; for, being obliged to eat a great deal to ſupport life, the ſmoothneſs of its teeth renders chewing difficult, and the quantity chewed inadequate to ſupply the ſtomach.

At three years old, the cow ſheds its horns, and new ones ariſe, which are permanent; at four years of age, the cow has ſmall pointed neat ſmooth horns, thickeſt near the head; at five they become larger, and are marked round with the former year's growth; and every year produces a new ring at the root; ſo that allowing three years before their appearance, and adding the number of rings, we have the animal's age. Some cows have horns, others have none; this ſeems a kind of caprice of nature, for which we can aſſign no reaſon.

Of all quadrupeds, the cow ſeems moſt liable to alteration from its paſture. In our own country, we perceive great varieties, produced by the variation of ſoil. In ſome they grow very large; in others, they are very diminutive. The breed of the Iſle of Man, and moſt parts of Scotland, is much leſs than that of England or Ireland.

The cow kind is found in moſt parts of the world, large or ſmall in proportion to the richneſs of the paſture. Africa is remarkable for the largeſt and the ſmalleſt cattle of this kind; as is India, alſo, Poland, Switzerland, and ſeveral other parts of Europe. Among the Eluth Tartars, where the paſtures are remarkably rich, the cow becomes ſo large, that he muſt be a tall man who can reach the tip of its ſhoulder. Almoſt every where the cow is found in ſome of its varieties; large, like the urus, or humped as the biſon; with ſtrait horns, or bending, inverted backwards, or turning ſideways to the cheek, like thoſe of the ram; and, in many countries, without horns, as in Iceland. The cattle of the Ukraine, where the paſture is excellent, become very fat, and are conſidered as one of the largeſt breeds of Europe. In Switzerland, among the mountains, are large; in France ſmall; very ſmall in Barbary. The famous bulls of Spain are by no means comparable to our own; nor is a Spaniſh bull fight worthy the applauſe beſtowed on it by their writers, requiring no great bravery, and little more addreſs, than to take advantage of the bull's miſtaking the cloak for the cavalier, and of his ſhutting his eyes (as this animal is ſaid to do) before he ſtrikes with his horns.

But the differences in ſize of this animal are not ſo remarkable as thoſe of its form, its hair, and its horns. Theſe are ſo very extraordinary, that they have been conſidered as conſtituting different creatures, and names have diſtinguiſhed what in reality is the ſame. The urus and the biſon have been regarded, from the variety in their make,

as diſtinct in their production; but they have a certain mark of one common ſtock; they breed among each other, and conſequently form one kind, notwithſtanding the extreme bulk of the urus, or the hump on the back of the biſon: their breed is fruitful, and among their deſcendants, the hump belonging to the biſon is ſoon worn away.

The URUS, or wild bull, inhabits chiefly the province of Lithuania; and grows to a ſize ſcarce equalled, except by the elephant; is quite black, except a ſtripe mixed with white, that runs from the neck to the tail, along the top of the back; the horns are ſhort, thick and ſtrong; the eyes fierce and fiery; on the forehead is a kind of garland of black curled hair, and ſome have beards of the ſame; the neck is ſhort and ſtrong, and the ſkin has an odour of muſk. The female, though leſs than the male, exceeds the largeſt of our bulls; nevertheleſs, her udder and teats are ſo ſmall, that they can ſcarcely be perceived. Upon the whole, however, this animal reſembles the tame one. *Geſner*, in his *Icon. Anim.* 34, ſays he ſaw a horn, he ſuppoſed, of an urus, hung in the Straſburg cathedral, which was ſix feet long.

The BISON differs in having a lump between its ſhoulders. Theſe animals are ſome very large, others diminutively little. This creature, in front, has ſomewhat the look of a lion, a long ſhaggy mane, a beard under his chin; his head little, his eyes red and fiery, with a furious look; his forehead large, and horns ſo big, and ſo far aſunder, that three men might often ſit between them. On the middle of the back grows a bunch almoſt as high as that of a camel, covered with hair, and which is conſidered as a great delicacy by the hunters. There is no purſuing him with ſafety, except in foreſts where are trees large enough to hide the men. He is generally taken by pitfals; the hunters dig holes in the ground, and covering them with boughs of trees and graſs, provoke the biſon to purſue them: they get on the oppoſite ſide of the pitfall, while the furious animal, running head foremoſt, falls into the pit, and is quickly overcome.

The breed of the urus, or thoſe without a hump, chiefly occupies the cold and temperate zones; the breed of the biſon, or thoſe with a hump, the ſouthern parts of the world; throughout India, and throughout Africa, from Mount Atlas to the Cape of Good Hope. In theſe countries, the biſon ſeems to prevail; where they have ſmooth, ſoft hair, are very nimble of foot, and in ſome meaſure ſupply the want of horſes. The biſon breed is expert and docile; many of them

bend their knees to take up, or ſet down burthens; and are treated by their maſters with much tenderneſs and care, which in India has degenerated into ſuperſtition. Theſe animals are, among the Hottentots, chiefly eſteemed. The bull is at once their protector and ſervant, attends the flocks, guards them, herds in the ſtraying ſheep, and ſhews no mercy to robbers, or even ſtrangers, who attempt to plunder. Theſe backeleys (as they are called) are taught to combat even the enemies of the kraal. Every Hottentot army is furniſhed with a herd of them, which is let looſe againſt the enemy. The backeley lives in the ſame hut with its maſter, and, by habit, gains an affection for him. When a backeley dies, a ſucceſſor is choſen by a council of the old men of the kraal; he is then joined with a veteran of his own kind, from whom he learns his art, becoms ſocial and diligent, and is taken for life into human friendſhip and protection.

The humps of the biſons are of different ſizes, ſome weighing from forty to fifty pounds, others leſs; it is not to be conſidered as a part indiſpenſable to the animal; it reſembles a griſtly fat; and is ſaid to cut and taſte ſomewhat like udder.

The American biſon is rather leſs than that of the ancient continent; its hair is longer and thicker, its beard more remarkable, and its hide more luſtrous and ſoft. They breed with the tame kinds, brought from Europe; and thus produce a race peculiar to that country.

The cow kind ſeems an ancient inmate in every climate, domeſtic and tame in civilized countries, ſavage and wild in wild countries, but capable of being uſeful in all: able naturally to defend itſelf againſt every enemy of the foreſt; and only ſubordinate to man: taken from the dam in a ſavage ſtate, either in Africa or Aſia, ſoon becomes humble, patient and familiar; and man may be conſidered, in thoſe countries, as almoſt helpleſs without their aſſiſtance.

THE BUFFALO.

IF we compare the buffalo with our common cow, no two animals can be more alike, either in form or nature; equally ſubmiſſive to the yoke, often living under the ſame roof, employed in the ſame domeſtic ſervices; the make and turn of their bodies greatly alike, yet no two animals can be more diſtinct. Such is the fixed averſion between

between theſe creatures, that the cow refuſes to breed with the buffalo, while it is known to propagate with the biſon, to which it has, in point of form, but very diſtant ſimilitude.

The buffalo is by no means ſo beautiful as the cow; his figure is more clumſy and aukward; his air wilder; and he carries his head lower and nearer the ground; his limbs are leſs fleſhy, his tail more naked of hair; his body ſhorter and thicker; his legs higher; his head ſmaller; his horns ſometimes ten feet long, not ſo round, but black and compreſſed, with a bunch of curled hair hanging down between them; his ſkin is alſo harder, thicker, blacker, leſs furniſhed with hair; his fleſh is hard, blackiſh, diſagreeable to the taſte and ſmell. The milk of the female much inferior to that of the cow, but abundant. In the warm countries, cheeſe and butter are made of buffalo milk. The leather made of its hide is well known for its thickneſs, ſoftneſs, and impenetrability. Being, in general, very much larger and ſtronger than the cow, the buffalo is employed in agriculture; uſed alſo in drawing burthens; ſometimes in carrying them; being guided by a ring thruſt through the noſe. Two buffaloes yoked in a waggon are ſaid to draw more than four ſtrong horſes; as their heads and necks are naturally bent downward, they are better fitted for the draught, and the whole weight of their bodies is applied to the carriage.

Wild buffaloes are very dangerous animals, often gore travellers, and trample them with their feet, until they have mangled the whole body: in woods not equally to be feared as in plains, becauſe in purſuit, their large horns become entangled in the branches, which gives time to eſcape. There is ſcarce any other method of avoiding their purſuit; they run with great ſwiftneſs; overturn a tree of moderate growth; and are ſuch ſwimmers, as to croſs the largeſt rivers without difficulty. Like all large animals of the torrid zone, they are very fond of the water; and, during their purſuit, often plunge in to cool themſelves.

In Italy, they make the food and riches of the poor. The female produces but one at a time, in the ſame manner as the cow; but the cow, as we know, goes nine months; whereas the buffalo continues pregnant twelve. They are afraid of fire; and, perhaps, in conſequence, have an averſion to red colours, that reſemble the colour of flame: it is ſaid, that in thoſe countries where they are found in plenty, no perſon dares to dreſs in ſcarlet.

Theſe

Theſe are regarded as the only real varieties of the cow kind; others have been ſuppoſed by naturaliſts to ſo many as eight or ten ſpecies; but after proper allowances for climate, paſture, &c. there ſeems no need to conſider others, as permanently or eſſentially different. Some are ſaid to grunt like a hog, others to ſmell of muſk. In Surat, a ſmall kind, not bigger than a dog, draw the children in carts.

OF THE

SHEEP AND GOAT.

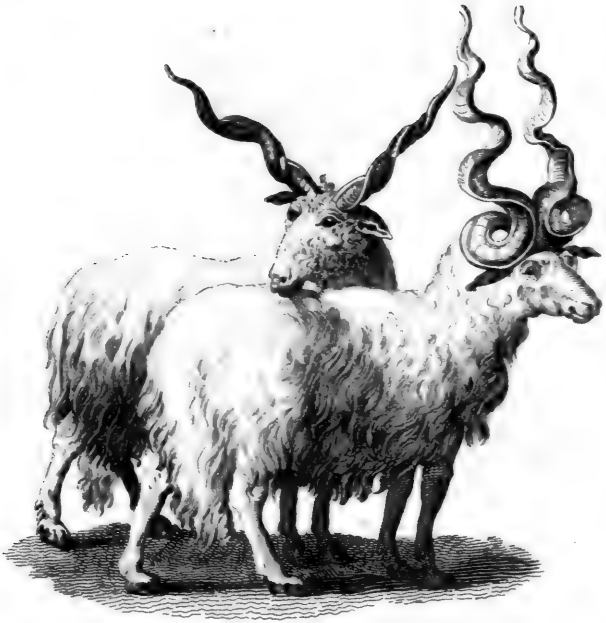
THE goat and the ſheep differ, in the form of their bodies, their covering, and their horns; and may be conſidered as two kinds, with regard to domeſtic purpoſes; but their internal conformation is alike; their feet, their four ſtomachs, their ſuet, their appetites, are the ſame; and they propagate with each other. The produce of the buck goat with the ewe in two or three generations returns to the ſheep. The ſheep and the goat, therefore, belong to one family; and were their races reduced to one of each, they would repleniſh the earth with their kinds.

Their internal ſtructure is not very remote from that of the cow kind, which they reſemble in their hoofs, and in chewing the cud. But the differences between theſe animals are ſufficiently apparent by their form and ſize; they are alſo diſtinguiſhed from deer, by never ſhedding their horns, which draws a line between the kinds; ſo that we may regard the ſheep and goat as ruminant animals of a ſmaller ſize, having permanent horns.

Theſe harmleſs and uſeful animals have been long reclaimed from the foreſt, and brought into a ſtate of domeſticity. The ſheep is the more ſerviceable creature in moſt places; but the goat has more ſenſibility and attachment. In the earlieſt ages, the goat ſeemed rather the greater favourite; and continues ſuch, in ſome countries, among the poor. But the ſheep has long become the principal object of human care; eſpecially in our country and climate.

The ſheep, in its preſent domeſtic ſtate, is of all animals the moſt defenceleſs and inoffenſive; and, if expoſed in its preſent ſtate to ſtruggle with its natural enemies of the foreſt, would ſoon be extirpated.

Loaded



Wallachian Sheep.

Loaded with a heavy fleece, incapable of defence by its horns, heavy, ſlow, and feeble, it can have no ſafety but from man. Thoſe without horns are moſt dull and heavy; thoſe whoſe fleeces are longeſt and fineſt, are moſt ſubject to diſorders; whatever changes have been wrought in this animal being by human induſtry, are intirely calculated for human advantage. A ſucceſſion of ages could ſcarce reſtore the ſheep to its primitive ſtate, ſo as to become a match for its foes of the foreſt.

The goat is much its ſuperior; has its particular attachments, ſees danger, and generally contrives to eſcape it; but the ſheep is timid without cauſe, and ſecure in real danger.

It does not appear, from early writers, that the ſheep was bred in Britain; nor till ſeveral ages after this animal was cultivated, that the woollen manufacture was carried on among us. That valuable branch of buſineſs lay for a conſiderable time in foreign hands; and we were obliged to import the cloth, manufactured from our own materials.

No country, however, produces ſuch ſheep as England; with larger fleeces, or better adapted for the loom. Thoſe of Spain, indeed, are finer, and we generally require ſome of their wool to work up with our own; but the weight of a Spaniſh fleece is much inferior to one of Lincoln or Warwickſhire: where it is no uncommon thing togive fifty guineas for a ram.

Sheep, like other ruminant animals, want the upper fore teeth; have eight in the lower jaw: two of theſe drop, and are replaced at two years old; four of them are replaced at three years old; and all at four. The new teeth are diſtinguiſhed by their freſhneſs and whiteneſs. Some breeds in England never change their teeth; theſe the ſhepherds call leather-mouthed cattle; and they are generally ſuppoſed to grow old a year or two before the reſt. Sheep bring one or two at a time; ſometimes three or four. They bear five months; and, by being houſed, bring forth at any time of the year.

If we look for this animal in its nobleſt ſtate, we muſt ſeek it in the African deſart, or the extenſive plains of Siberia. Its deſcendants have ſuffered ſo many changes, as entirely to diſguiſe the kind, and often to miſlead the obſerver. Scarce any two countries has ſheep alike, in ſize, covering, ſhape, or horns.

The woolly ſheep is found only in Europe, and ſome of the temperate provinces of Aſia. When tranſported into hotter countries, it aſſumes a covering fitted to the climate, hairy and rough; loſes its

fertility, and its fleſh no longer has the ſame flavour. In very cold countries, it ſeems equally a ſtranger; requires unceaſing attention to preſerve it; and though ſubſiſting as well in Greenland as in Guinea, yet it ſeems a natural inhabitant of neither.

The Iceland ſheep reſembles ours in form; but differs in the number of horns, having four, ſometimes eight, growing from different parts of the forehead. Theſe are large and formidable; and the animal ſeems fitted for a ſtate of war: yet, is equally mild, gentle, and timid. Its wool is long, ſmooth, and hairy. Its colour a dark brown; and under its outward coat, it has a covering, rather reſembling fur than wool, being fine, ſhort, and ſoft.

A ſecond variety is the broad-tailed ſheep, of Tartary, Arabia, Perſia, Barbary, Syria, and Egypt. This broad and heavy tail often weighs from twenty to thirty pounds: ſometimes grows a foot broad, and muſt be ſupported by a ſmall kind of board, that goes upon wheels. This tail is not woolly underneath like the upper part, but bare; and the natives, who conſider it as a great delicacy, are very careful in preſerving it from injury. Their fleeces, in the temperate climates, are ſoft and woolly; in the warmer latitudes hairy; yet in both theſe ſheep preſerve the enormous ſize of their tails.

A third variety is the ſheep called ſtrepſicheros, native of the iſlands of the Archipelago, which differs from our ſheep, in having ſtrait horns, ſurrounded with a ſpiral furrow.

Another variety is the Guinea ſheep, generally found in the tropical climates. They are large, with a rough, hairy ſkin, ſhort horns, ears hanging down, with a kind of dewlap under the chin. They differ greatly in form from others; but breed with them. Theſe, of all the domeſtic kinds, ſeem to approach neareſt the ſtate of nature: are larger, ſtronger, and ſwifter than others; conſequently better fitted for foreſt life. However, they ſeem to rely, like the reſt, on man for ſupport; being entirely of a domeſtic nature, and ſubſiſting only in warm climates.

Theſe varieties are capable of producing among each other; their peculiarities of form reſult from climate and cultivation. While man thus cultivates the domeſtic kinds, he drives away the ſavage race, which is leſs beneficial, and more headſtrong. This is found in ſmall numbers in uncultivated countries, where they have ſubſiſted by ſwiftneſs or ſtrength. In Greece, Sardinia, Corſica, and particularly in the deſerts of Tartary, the moufflon is found, that is thought by

M. Buffon to have been the primitive race; and that has been known to breed with the domeſtic animal.

The moufflon, (or muſimon,) though covered with hair, bears ſtrongeſt ſimilitude to the ram: like the ram, has the eyes placed near the horns: its ears are ſhorter than thoſe of the goat: reſembles the ram in the contours of its form. The horns alſo are alike; are yellow; have three ſides, as in the ram, and bend backwards in the ſame manner behind the ears. The muzzle, and inſide of the ears, are whitiſh, tinctured with yellow; the other parts of the face, browniſh grey. The general colour of the body is brown, approaching that of the red deer. The inſide of the thighs and belly are white, tinctured with yellow. The muſimon is found in a ſavage ſtate, and maintains itſelf, by force or ſwiftneſs, againſt all animals that live by rapine. From its extreme ſpeed, many have inclined to rank it among deer: but the muſimon never ſheds its horns. Theſe ſometimes grow to a ſurpriſing ſize; many of them meaſuring, in their convolutions, two ells. From yellow, the horns become the darker as the animal grows older; ſometimes are found broken off in ſuch a manner, that the ſmall animals of the foreſt creep into the cavity for ſhelter. The female reſembles the male, but is leſs, and her horns never grow to ſuch prodigious ſize as thoſe of the ram.

N. B. The muſimon is reckoned a goat by thoſe who divide the kinds, but if, as aſſerted, breeds with the ſheep, evidently belongs to both kinds.

The Goat ſeems better fitted for a life of liberty than the ſheep: is naturally more lively, and of keener inſtinct: eaſily attaches itſelf to man, and ſeems ſenſible of his careſſes: is ſtrong and ſwift, courageous, playful, lively, capricious, and vagrant: not eaſily confined to its flock; but chooſes its paſture, and loves to ſtray from others: delights in climbing precipices; in going to the very edge of danger; on rocks hanging over the ſea, and on a very narrow baſe, often ſleeps in ſecurity. Nature has fitted it for traverſing declivities; the hoof being hollow underneath, with ſharp edges. This hardy animal is eaſily ſuſtained, and chooſes the heathy mountain, or the ſhrubby rock; prefers the tops of boughs, or the tender bark of young trees; ſleeps expoſed to the ſun; and ſeems to enjoy its heat: fears not ſtorm, or rain; but immoderate cold is ſaid to afflict it with a vertigo. The inconſtancy of its nature is perceivable in their regularity of its gait; it goes forward, ſtops, runs, approaches, flies, merely from caprice, and extreme vivacity of diſpoſition.

The goat produces two at a time; three at moſt. But in warm climates, though the animal degenerates, and grows leſs, it becomes more fruitful, bringing three, four, or five. The goat, like the ſheep, continues five months with young; and, in ſome places, bears twice a year.

The goat's milk is ſweet, nouriſhing, and medicinal; not ſo apt to curdle on the ſtomach as that of the cow; and, therefore, preferable for thoſe of weak digeſtion. The milk differs in flavour from that of the cow or the ſheep; the ſhrubby paſtures, and heathy mountains, imparting an agreeable wildneſs to its taſte. In Ireland and Scotland, on mountains almoſt naked, the goat gleans a living; and ſupplies the hardy natives with comforts. Beds are made of its ſkins; its milk is food; furniſhes alſo butter and cheeſe; and the fleſh (eſpecially of the kid) is a delicacy, ranked by ſome as not inferior to veniſon.

We find this animal in moſt parts of the world. In the north, where the paſture is coarſe and ſcanty, the goat finds a ſubſiſtence; between the tropics, the goat is adapted to the heat of the climate, and its fleſh improves.

A remarkable variety of the goat is that of Natolia or Angora in Syria, which has ears longer and broader than ours. The horns of the male are black, iſſue horizontally on each ſide the head, and are twiſted like a cork-ſcrew. The horns of the female are ſhorter, and encircle the ear ſomewhat like thoſe of a ram. Their colour is a dazzling white; their hair very long, thick, fine, and gloſſy; but degenerates at the diſtance of a day's journey from this peculiar neighbourhood. It is ſold into all parts of Europe; and is the baſis of the beautiful ſtuffs known among us by the name of camlet.

The Syrian goat is a ſecond variety, ſomewhat larger than ours, with ears hanging down almoſt to the ground; broad in proportion; ſometimes ſo troubleſome, that the owners cut off one to enable the animal to feed. The horns not above two inches and an half long, black, and bending a little backwards; the hair of a fox colour; under the throat are two excreſcences, like the gills of a cock: chiefly kept round Aleppo for their milk.

A third variety is the little goat of America, the ſize of a kid, but the hair as long as that of the ordinary breed. The horns, which do not exceed a finger's length, are thick, and bend downwards ſo cloſe to the head, that they almoſt enter the ſkin.

The

The blue goat of the Cape of Good Hope, may be ranked as a fourth variety: is in ſhape like the domeſtic, but nearly the ſize of a ſtag. Its hair very ſhort, of a delightful blue; which it loſes greatly when dead: has a very long beard; horns not ſo long in proportion as in others; turned ſpirally: has very long legs, but well proportioned; the fleſh is well taſted, but lean; therefore chiefly killed for its ſkin: abounds in the uncultivated parts; where are found others, beautifully ſpotted with red, white, and brown.

The Juida (or Whida) goat reſembles ours, except in ſize, being much ſmaller: is common in Guinea, Angola, and along the coaſt of Africa: is not much larger than a hare, but extremely fat, and its fleſh admirably taſted: is in that country univerſally preferred to mutton.

The foregoing are certainly known to belong to the goat kind; there are others nearly reſembling the goat, whoſe kindred is not equally evident: for being found in a ſtate of nature, they have not been ſufficiently ſubjected to obſervation. Theſe are the CHAMOIS and the IBEX; both approach the goat in figure, and have horns that never ſhed; but, at the ſame time, differ more from each other than from the animal in queſtion.

They are both natives of the Alps, the Pyrenees, and the mountains of Greece; there they continue to exiſt in vaſt numbers, in ſpite of hunters and beaſts of prey that inceſſantly purſue them.

The IBEX reſembles the goat in ſhape; but the horns are much larger; are bent backward, full of knots; and it is generally aſſerted that a knot is added every year. Some of theſe are found two yards long. The male ibex has a large black beard, is of a brown colour, with a thick warm coat of hair; a ſtreak of black runs along the top of the back; the belly and back of the thighs are of a fawn colour.

The CHAMOIS, though wild, is docile, and eaſily tamed; is about the ſize of a domeſtic goat, which it much reſembles; is agreeable, lively, and active beyond expreſſion. The chamois' hair is ſhort; in ſpring is aſh coloured; in autumn dun, inclining to black; in winter, blackiſh brown: abounds in the mountains of Dauphiny, of Piedmont, Savoy, Switzerland, and Germany: is peaceful, gentle, and lives in ſociety, in flocks of from four to fourſcore, or an hundred, diſperſed on the crags of the mountains. The large males feed detached, except when they approach the females, and drive away the young; which is during October and November: bring forth in March and April. The young keep with the dam five months, or longer, if not ſeparated:

ſeparated; they live between twenty and thirty years. Their fleſh is good. The chamois has ſcarce any cry; at moſt a kind of feeble bleat, by which the parent calls its young. But to warn the reſt of the flock, uſes a hiſſing noiſe, which is heard at a great diſtance. This creature is extremely vigilant, and has a quick ear, and ſcent, and a moſt piercing eye. When it ſees its enemy, it ſtops for a moment; and inſtantly flies off. Its ſmell diſcovers a man at half a league diſtance if to windward. When alarmed, the chamois begins his hiſſing note with ſuch force, that the rocks and the foreſts re-echo to the ſound. The firſt hiſs continues as long as the time of one inſpiration. In the beginning it is very ſharp; deeper towards the cloſe. Having repoſed a moment, he again looks round, and continues to hiſs by intervals, till the alarm has ſpread to a very great diſtance. During this time, it ſeems in the moſt violent agitation; ſtrikes the ground with its fore-foot, and ſometimes with both; bounds from rock to rock; turns and looks round; runs to the edge of the precipice; and flies with all its ſpeed. The hiſſing of the male is much loudeſt and ſharpeſt; it is performed through the noſe; and is properly a very ſtrong breath, driven violently through a ſmall aperture. The chamois feeds on the beſt herbage, and chooſes the moſt delicate parts of plants, and of aromatic herbs, which grow on the ſides of the mountains: drinks little while feeding on ſucculent herbage; chews the cud in the intervals of feeding. This animal is greatly admired for the beauty of its eyes, which are round and ſparkling: has two ſmall horns, of a beautiful black, riſing from the forehead almoſt between the eyes, and jetting out forward; at their extremities they bend a little backward, in a ſmall circle, and end in a very ſharp point. The ears are placed near the horns: on each ſide of the face are two ſtripes of black; the reſt being a whitiſh yellow. Theſe animals are incommoded by heat, and never found in ſummer, except in caverns of rocks, amid unmelted ice, under the ſhade of ſpreading trees, or of rough and hanging precipices, which keep off the rays of the ſun. They feed early in the morning, and late in the evening. During winter, lodge in the hollows of rocks to avoid the *avelanches*, or ſnow-rolls, and dig through the ſnow for food. They run along the rocks with eaſe, and leap from one to another, ſo that no dogs can purſue them. They mount or deſcend in an oblique direction; throw themſelves down a rock of thirty feet, and alight ſecurely on ſome excreſcence, or fragment, on the ſide of the precipice, which is juſt large enough to receive their feet: in their deſcent, they ſtrike

ſtrike the rock with their feet, three or four times, to ſtop the velocity of their motion; and, when arrived on their baſe below, are at once fixed and ſecure. When jumping in this manner, they ſeem rather to have wings than legs. Their hinder legs are rather longer than their fore-legs, and bend ſo that, when they deſcend upon them, they break the force of the fall. Hunting the chamois is very laborious, and difficult. The uſual way is to hide behind the clefts of rocks and ſhoot them. Dogs are quite uſeleſs in this chace, as they rather alarm than overtake. Nor is it without danger to men; for often when the animal finds itſelf over-preſſed, it drives at the hunter with its head, and tumbles him down the neighbouring precipice, unleſs he has time to lie down, and let the chamois paſs over him. This animal cannot go upon ice when ſmooth; but if there be the leaſt inequalities on its ſurface, it bounds along, and evades purſuit.

Such are the quadrupeds that belong to the goat kind. It is hard to diſcover where the ſheep ends and the goat begins; ſtill harder to determine the boundaries between the goat and the deer. But in tranſitions from one kind to another, is generally a middle race, that partakes of each, and can preciſely be referred to neither. Such are the gazelles, properly neither goat nor deer, yet poſſeſſing many marks of both.

THE GAZELLES,

OR

ANTELOPES,

LIKE the goat, have hollow permanent horns, a gall bladder, and feed rather upon ſhrubs than paſture. But they reſemble the roe-buck in ſize and form; in having deep pits under the eyes; in the colour and nature of their hair; in the bunches upon their legs, which differ in being on the fore-legs in theſe, on the hind-legs in the other.

They differ from both goat and deer by their horns, which are annulated (or ringed) with longitudinated depreſſions running from the bottom to the point; by having bunches of hair on their fore-legs; and by a ſtreak of black, red, or brown, running along

the lower part of their ſides; and three ſtreaks of whitiſh hair in the internal ſide of the ear. Of all animals in the world, the gazelle has the moſt beautiful eye, extremely brilliant, yet ſo meek that eaſtern poets compare the eyes of their miſtreſſes to thoſe of this animal, as the higheſt compliment. The gazèlle is moſt delicately and finely limbed; its hair ſhort, fine, and gloſſy. Its hinder legs are longer than thoſe before; is extremely ſwift; runs along in an even, uninterrupted courſe. Moſt are brown on the back, white under the belly, with a black ſtripe, ſeparating thoſe colours between. The tail of various lengths, but in all covered with pretty long hair; and the ears beautiful, well placed, and terminating in a point; hoofs cloven.

Of theſe animals, M. Buffon makes twelve varieties; which is much fewer than other naturaliſts have made them. *Firſt*, the GAZELLA, properly ſo called, the ſize of a roe-buck, and much reſembling it; but differing in the horns, which are black, hollow, (like thoſe of the ram, or goat) and never fall. The *ſecond*, the KEVEL, rather leſs than the former; its eyes larger; its horns flatted on the ſides. The *third*, the CORIN, ſtill leſs; its horns ſmaller, ſmoother, and their annular prominences ſcarce diſcernible. Some of theſe animals are often ſeen ſtreaked like the tiger. The *fourth*, the ZEIRAN, which he ſuppoſes to be a larger kind of gazelle, found in India and Perſia. The *fifth*, the KOBA; the *ſixth*, the KOB: theſe differ only in ſize, the former being much the largeſt. The *ſeventh* he calls after its Egyptian name, the ALGAZEL; the horns very long, being generally three feet. The *eighth*, the PAZAN; called by ſome, the bezoar goat. As the algazel feeds on the plains, this is only found in the mountains, of Egypt, Arabia, and Perſia. This is the animal famous for that concretion in the inteſtines or ſtomach, called the Oriental Bezoar, which was once in ſuch repute all over the world for its medicinal virtues. The *ninth* is the NANGUER, a native of Senegal; differs ſomewhat in ſhape and colour; but particularly in its horns, which are ſtrait to near the points, where they crook *forward*, pretty much as in the chamois they crook backward. The *tenth* is the ANTELOPE, ſo well known to the Engliſh, who have given it the name; is the ſize of a roe-buck; reſembles the gazelle, but differs in having deeper eye-pits; the horns differ alſo, being about ſixteen inches long, almoſt touching at the bottom, ſpreading as they riſe, ſo as at their tips to be ſixteen inches aſunder. They have annular prominences, but not ſo

diſtinguiſhable as in the gazelle. A very remarkable double flexure diſtinguiſhes them: at the root, a tuft of very long hair. The antelope is brown on the back, and white under the belly; but theſe colours are not ſeparated by the black ſtreak which belongs to the gazelle kinds. The *eleventh* variety M. Buffon calls the LIDME, which has very long horns. The *twelfth* and laſt, he calls the Indian ANTELOPE, whoſe horns are very ſmall.

To theſe may be added three or four varieties, which equally reſemble both the goat and the gazelle. Firſt, the BUBALUS, that ſeems allied to the cow, the goat, and the deer: like the ſtag in ſize and figure, particularly its legs; but has permanent horns, like the goat; and reſembling thoſe of the gazelles; while the make of its head is exactly like the cow in the length of its muzzle, and in the diſpoſition of the bones of its ſcull. Has a narrow, long head; eyes placed very high; forehead ſhort and narrow; horns about a foot long, black, thick, annulated; ſhoulders very high, a kind of bunch on them, terminating at the neck; tail about a foot long, and tufted. The hair of this animal remarkable, being thicker at the middle than at the root; the only inſtance, except the elk. Common in Barbary. Seems with moſt propriety reckoned among the antelopes.

The ſecond anomalous animal, M. Buffon calls the CONDOMA; ſuppoſed equal in ſize to the largeſt ſtag, with hollow horns, and varied flexures above three feet long; at their extremities, two feet aſunder. Along the back runs a white liſt, another of the ſame colour croſſes this, at the bottom of the neck, which it ſurrounds: two more run round the body, one behind the fore-legs, the other parallel to it before the hinder. The general colour of the body greyiſh; the belly white: has a long grey beard; legs long, but well proportioned; native of Africa.

A third is the GUIB: reſembles the gazelles, except the colour of the belly, which is white in them, but in this of a deep brown. Its horns alſo are ſmooth and poliſhed; is remarkable for white liſts, on a brown ground, diſpoſed along the animal's body, as if it were covered with harneſs: is native of Africa.

The African wild goat is a fourth: of a dark aſh colour: in the middle of the head a hairy tuft, ſtanding upright; on both ſides, between the eyes and the noſe, are very deep cavities, which contain a yellow oily liquor, (coagulating into a black ſubſtance, with a ſmell between muſk and civet): if taken away, again runs out.

To theſe we may add the CHEVROTIN, or little Guinea deer, the leaſt of all cloven-footed quadrupeds; its legs, at the ſmalleſt part, little thicker than the ſhank of a tobacco-pipe; is about ſeven inches high, twelve from the point of the noſe to the inſertion of the tail; is completely formed like a ſtag in miniature; except that its horns, when it has any (as in Guinea only), are of the gazelle kind, hollow and annulated: has two canine teeth in the upper jaw; in which it differs from the goat or deer, and makes a ſingular ſpecies. The hair, which is ſhort and gloſſy, is in ſome a beautiful yellow, except the neck and belly, which is white. Native of India, Java, Ceylon, Guinea, and the tropics. They may be eaſily tamed, and become familiar and pleaſing; but are of ſuch delicate conſtitutions, they can bear no climate but the hotteſt.

Such are the gazelles, or antelope kinds: of warm climates, extremely ſwift, ſhy, ſure-footed, though among rocks or precipices, impracticable but to themſelves: birds only can follow, and overtake them: for this purpoſe the falcon is trained throughout the eaſt; and their chace forms a principal amuſement and employment of thoſe countries.

THE

DEER KIND.

THE ſtag ſeems made to embelliſh the foreſt, and animate its ſolitudes. His eaſy elegance of form, and lightneſs of motion; his large branches, rather the ornament than defence of his head; his ſize, ſtrength and ſwiftneſs, rank him among the nobleſt quadrupeds.

The firſt year, a ſtag has no horns, but a horny excreſcence, ſhort, rough, and covered with a thin hairy ſkin. The ſecond year, his horns are ſingle and ſtraight; the third year, they have two antlers; the fourth, three; the fifth, four; the ſixth, five (this number is not certain). After the ſixth year, the antlers do not always increaſe.

Theſe horns are ſhed yearly. They are firm and ſolid, and employed in making knife-handles, &c. While young, they are ſoft and tender. The animal, on ſhedding his horns, hides himſelf in thickets, never venturing out to paſture, except by night. This uſually happens

pens in ſpring; the new horns are very painful, and of quick ſenſibility. When the old horn is fallen, the bones of the ſkull are bare, being covered only with a tranſparent perioſteum, which covers all bones. After a ſhort time, this ſkin begins to ſwell, and forms a ſoft tumour, containing a great deal of blood, and is gradually covered with a downy ſubſtance that feels like velvet. This tumour buds from the point like the graft of a tree; and, riſing by degrees, ſhoots out the antlers on either ſide, ſo that ſpeedily, in proportion to the animal's condition, the head is completed: but at firſt is very ſoft, and has a ſort of bark, which is a continuation or integument of the ſkull. It is velveted and downy; every where furniſhed with blood-veſſels, that nouriſh the growing horns. As theſe creep along the branches, they imprint the whole ſurface. The horns begin to harden at bottom while the upper part remains ſoft, and continues growing. Hence it appears they grow differently from thoſe of ſheep or cows; in which they increaſe from the bottom. When the whole head has received its full growth, the extremities begin to acquire ſolidity; the velvet covering, or bark, with its blood-veſſels, dry up, and begin to fall; this the animal haſtens and completes, by rubbing its antlers againſt every tree.

If a ſtag be caſtrated when its horns are fallen, they will never return; if when they are on, they will never fall. If partially, he will want the horn on that ſide. Plenty or ſcarcity of proviſion, fatigue and diſeaſe, greatly affect the growth of the horns. It ſeldom happens that the branches on both ſides fall off together, there being two or three days interval. The old ſtags uſually ſhed their horns firſt, the latter end of February, or in March; thoſe of the ſecond head (between five and ſix years old) about the latter end of March; thoſe younger, in April; the youngeſt of all, in May: they generally ſhed them in pools of water, and this has given riſe to the opinion of their hiding them.

The horns generally increaſe in thickneſs and in height from the ſecond year to the eighth, but feel the impreſſions of age, and ſhrink like the reſt of the body. The horns alſo partake of the nature of the ſoil; in fertile paſtures they are large and tender; in barren ſoils they are hard, ſtunted, and brittle, correſpondent to the ſtate of the creature himſelf.

When ſtags have ſhed their horns, they are utterly unable to defend themſelves. They walk with their heads ſtooping, to keep them from ſtriking againſt the trees above. Thus they continue near three months before their heads acquire their full growth and ſolidity. About the end

of

of Auguſt, they return to the mountain to ſeek the hind, to whom they call with a loud tremulous note. At this time their neck is ſwollen; they appear bold and furious; fly from country to country: and butt with their horns. At the end of this period of madneſs, the creature that was before fat, ſleek, and gloſſy, becomes lean, feeble, and timid. As he is above five years coming to perfection, he lives about forty years.

The uſual colour of the ſtag in England was red; nevertheleſs, the greater number in other countries are brown. Some few are white; but theſe perhaps obtained this colour in a former ſtate of domeſticity. Of all animals in this climate, none have ſo beautiful an eye as the ſtag: it is ſparkling, ſoft, and ſenſible. His ſmelling and hearing are in perfection. When alarmed, he lifts his head and erects his ears. Man is not the enemy he moſt fears; he ſeems delighted with the ſhepherd's pipe; and the hunters ſometimes uſe that inſtrument to allure him.

The ſtag eats ſlowly, and is delicate in his choice of paſture. He retires to covert to chew the cud in ſecurity. His rumination ſeems performed with difficulty; not without much ſtraining, and a kind of hiccup, which is eaſily perceived the whole time. Some years ago, William Duke of Cumberland cauſed a tiger and a ſtag to be incloſed in the ſame area; the ſtag made ſo bold a defence, that the tyger was at laſt obliged to fly.

The cry of the hind, or female, is not ſo loud as that of the male, and never excited but by apprehenſion for herſelf or her young. She has no horns. The time of geſtation is between eight and nine months; generally produce but one about May, or June: they take great care to hide their young, ſince almoſt every creature is then a formidable enemy. What is more unnatural, the ſtag himſelf is a profeſſed enemy, and ſhe is obliged to uſe all her arts to conceal her young from him as from the moſt dangerous of her purſuers. At this ſeaſon, the courage and arts of the male ſeem transferred to the female. The calf (as the young ſtag is called) accompanies the dam the whole ſummer; in winter, the hind, and young males aſſemble in herds, which are numerous in proportion as the ſeaſon is ſevere.

The ſtags of China are no taller than a common houſe-dog; hunting them is a principal diverſion of the great. Their fleſh, while young, is good; at maturity, hard and tough: the tongue, the muzzle, and the ears, are in particular eſteem among that luxurious people. Their manner of taking them is ſingular: they carry a head of the female ſtuffed, and exactly imitate her cry; upon this the male appears, and perceiving

perceiving the head (which is all that the hunter, who is himſelf concealed, diſcovers) advances, the company then riſe, ſurround, and often take him alive.

There are very few varieties in the red deer of this country. But in different parts of the world, they differ in form, ſize, horns, and colour.

The Corſican ſtag is a very ſmall animal, not above half the ſize of ours. His body is ſhort and thick, his legs ſhort, and his hair a dark brown.

In the foreſts of Germany is a kind of ſtag, named by the ancients the Tragelaphus, which the natives call the Bran, or Brown Deer; is of a darker colour than the common ſtag, of a lighter ſhade upon the belly, and long hair upon the neck and throat, by which it appears bearded, like the goat. The Hippelaphus is of the ſame race.

The Axis (of Pliny), between the ſtag and the fallow deer, is a beautiful ſtag inhabiting the banks of the Ganges, Ceylon and Java; are very tame, and, though they readily eat bread, will refuſe a piece that has been breathed on.

Although there are but few varieties of the deer kind, yet the deer ſeems generally diffuſed over the earth. America produces ſtags, and deer. The Mexicans have a breed of white ſtags in their parks, which they call Stags Royal. The Americans are ſaid to have brought the ſtag to the ſame domeſtic tameneſs as our ſheep, goats, or cattle. They ſend them forth in the day-time to feed in the foreſts; and at night they return home with the herdſman who guards them.

THE FALLOW DEER.

THE ſtag and the fallow deer are alike in form, in diſpoſition, in the furniture of their heads, in ſwiftneſs and timidity; yet they never herd together, or form a mixed breed; and where the ſtag is common, the buck ſeems a ſtranger. The fallow deer are leſs robuſt, and ſavage than the ſtag; are, in general, bred in parks, and kept for their veniſon. The horns of the buck are broad and palmated; whereas thoſe of the ſtag are in every part round; they are ſhed yearly and take the uſual time for repairing. The fallow deer is eaſily tamed, and feeds upon many things which the ſtag refuſes. By this means it preſerves its veniſon better. The doe goes with young above eight months, common-

ly brings one: the buck comes to perfection at three, and lives till ſixteen years. The ſtrength, cunning and courage of this animal, is inferior to the ſtag; being lighter, and not tracking ſo deeply, it leaves a leſs powerful and laſting ſcent, and the dogs in purſuit are more frequently at a fault.

We have in England two varieties of the fallow deer, which are ſaid to be of foreign origin. The beautiful ſpotted kind, ſuppoſed to have been brought from Bengal; and the very deep brown ſort, introduced by King James the Firſt, from Norway. From having obſerved their hardineſs, and that they could endure the winter, even in that ſevere climate, without fodder, he brought over ſome of them into Scotland, and diſpoſed of them among his chaces. Since that time, they have multiplied in many parts of the Britiſh empire; and England is now become more famous for its veniſon, than any other country. Found in moſt parts of Europe, in Greece, Syria, and the north of China.

THE ROE-BUCK

IS the ſmalleſt of the deer kind in our climate, and is almoſt extinct, except in ſome of the highlands of Scotland. Exceeds three feet long, and two feet high; horns from eight to nine inches long, upright, round, divided into only three branches, and are deciduous. Body covered with very long hair, well adapted to the rigour of its mountainous abode. The lower part of each hair is aſh-colour; near the ends is a narrow bar of black, and the points are yellow. The hairs on the face are black, tipped with aſh-colour. The ears are long, their inſides a pale yellow, and covered with long hair. The ſpaces bordering on the eyes and mouth, are black. The cheſt, belly, legs, and inſide of the thighs, are yellowiſh white; the rump pure white; the tail very ſhort. This animal is very elegant and ſwift.

The roe-buck courts the ſhady thicket, and the riſing ſlope. Its hair is always ſmooth, clean, and gloſſy; it frequents only the drieſt places, and the pureſt air. Though but a little animal, yet, when its young is attacked, it faces even the ſtag himſelf, and often comes off victorious. It is cunning, difficult to purſue, and, though its ſcent is much ſtronger than that of the ſtag, more frequently makes good a retreat. The ſtag never uſes art till his ſtrength declines; but when the

the roe finds its firſt efforts to eſcape without ſucceſs, it returns on its former track, again goes forward, and again returns, till by its various windings, the ſcent is entirely confounded, and the laſt emanations joined to thoſe of its former courſes. It then, by a bound, goes to one ſide, lies flat on its belly, and permits the pack to paſs by without offering to ſtir.

Theſe animals live in families; the ſire, the dam, and the young ones; and never admit a ſtranger. All the deer kind are inconſtant but the roe-buck, who never leaves its mate; as they have been generally bred up together from fawns, their attachment is ſtrong, permanent, and mutual. The female fawns in May; goes with young five months and an half; which diſtinguiſhes this animal from all others of the deer kind, that continue pregnant more than eight.

The female retreats to the thickeſt woods, being not leſs apprehenſive of the buck than of the wolf, the wild cat, and other ravenous animals; generally produces two, very rarely three. In about ten or twelve days theſe are able to follow their dam, except purſued. On ſuch occaſions, the tenderneſs of the dam is extraordinary; leaving them in the deepeſt thickets, ſhe offers herſelf to the danger, and flies before the hounds, to miſlead them from the retreat of her little ones. Such animals as are not beyond her power, ſhe boldly encounters; attacks the ſtag, the wild cat, and the wolf; enemies, which, in conjunction with mankind, have diminiſhed the ſpecies.

The fawns follow the deer eight or nine months. They ſhed their horns the latter end of autumn, and renew them during winter. When they fall, and new ones appear, the roe-buck does not forſake its uſual haunts, but keeps down its head to avoid ſtriking its horns againſt the branches of trees, the pain of which it ſeems to feel with exquiſite ſenſibility. It ſeldom is found to live above twelve or fifteen years; if kept tame, not above ſix or ſeven. They may be ſubdued, but never domeſticated, or be made familiar: inhabits moſt parts of Europe, in Tartary and China, not Africa. Uncertain whether an American animal of this kind is of this ſpecies, or one reſembling it, that is very numerous, as well in Louiſiana as in Braſil.

THE ELK.

THE Elk is rather of the buck than the ſtag kind, as its horns are flatted toward the top; but far exceeds in ſtature, being often ten feet high: is called in Europe the Elk, and in North America the Mooſe-deer. It is timorous and gentle; content with its paſture, and never willing to diſturb any other animal, when ſupplied itſelf.

The hair is very long and coarſe: the ears a foot and an half long. The upper jaw longer by ſix inches, than the lower; and almoſt divided by a deep hollow: has a ſort of beard under the throat, hanging from a ſmall excreſcence, and a prominence in the middle of the forehead. The noſtrils four inches long on each ſide the mouth; noſe very broad; it uſes its fore feet, which are very ſharply hoofed, to ſtrike down its enemies; hind-legs much ſhorter than the fore-legs; hoofs very much cloven; colour of the body in general a hoary black, and grey about the face.

There are two kinds, the common grey mooſe, which is not very large, and the black mooſe; all have flat palmated horns, the palm very large, having a ſhort trunk at the head, and immediately ſpreading above a foot broad, with a kind of ſmall antlers, like teeth, on one of the edges.

The grey mooſe-deer is about the ſize of a horſe; as in all of this kind the upper lip is much longer than the under, it is ſaid they go backward as they feed. Their noſtrils are ſo large that a man may thruſt his hand in a conſiderable way.

Joſſelyn, the firſt Engliſh writer who mentions the black mooſe, ſays, it is a goodly creature, twelve feet high, with exceeding fair horns, that have broad palms, two fathoms from the top of one horn to another: that it is a creature, or rather a monſter of ſuperfluity, and many times bigger than an Engliſh ox. This Dudley confirms, but gives to the horns only thirty-one inches between tip and tip: however, that ſuch an extraordinary animal as Joſſelyn deſcribes, has actually exiſted, we cannot doubt, ſince horns twelve feet from tip to tip have often been found in a foſſil ſtate, as well in Ireland as in America.

Theſe animals delight in cold countries, feeding on graſs in ſummer, and bark of trees in winter. The natives prepare to hunt them when the ſun begins to melt the ſnow by day, which is frozen again at night; for then the icy cruſt which covers the ſnow, uſually four feet deep, is too weak to ſupport ſo great a bulk, and retards the creature's motion. The timorous

timorous animal, by its endeavours to eſcape, ſinks at every ſtep it takes. Still it purſues its way through a thouſand obſtacles: the ſnow yields to its weight; the ſharp ice wounds its feet; and its lofty horns are entangled in the branches as it paſſes: theſe are broken down with eaſe; and where the mooſe-deer runs, is traced by the ſnapping off branches of trees, as thick as a man's thigh, with its horns. The chace laſts thus a whole day; ſometimes two, or three days. The mooſe trots on (for that is its uſual pace), till its purſuers come up; after repeated wounds, and repeated exertions, quite tired, and ſpent, it ſinks, like a ruined building, and ſhakes the earth beneath its fall.

The fleſh is well taſted, and ſaid to be very nouriſhing. The hide is ſtrong, and ſo thick, that it has been often known to turn a muſket ball. The fur, when viewed through a microſcope, appears ſpongy like a bulruſh, and is ſmaller at the roots and points than in the middle; for this reaſon, it lies very flat and ſmooth, and though beaten and abuſed never ſo much, always returns to its former ſtate.

THE REIN-DEER

IS a native of the polar regions, and incapable of ſuſtaining more temperate climates. From it the natives of Lapland and Greenland ſupply moſt of their wants; like a horſe, it conveys them and their ſcanty furniture from mountain to mountain; like a cow it gives milk; and like the ſheep, it furniſhes a warm, though homely clothing: the milk affords cheeſe, the fleſh, food; the tendons, bowſtrings; and when ſplit, thread; the horns, glue; the bones, ſpoons.

The rein-deer ſomewhat reſembles the elk in its horns, has brow-antlers, very large, and hanging over the eyes, palmated toward the top, and bending forward. The rein-deer is much ſmaller, lower, and ſtronger built than the ſtag; its legs ſhorter and thicker, its hoofs much broader, its hair much thicker and warmer, its horns much larger, as alſo its ears; its pace is rather a trot than a bounding, and this it can continue for a whole day; its hoofs are cloven and moveable, ſo that it ſpreads them abroad as it goes, to prevent ſinking in the ſnow, which, when it raiſes its feet again, occaſions them to ſtrike together with an audible crack: the elk has the ſame peculiarity. The female rein-

deer has horns as well as the male, by which the ſpecies is diſtinguiſhed from every animal of the deer kind.

When the rein-deer firſt ſhed their coat they are brown; but, as ſummer approaches, their hair grows whitiſh; and at laſt, nearly grey. They are, however, always black about the eyes. The neck has long hair, hanging down, and coarſer than other parts. The feet, at the inſertion of the hoof, are ſurrounded with a ring of white. The hair in general ſtands ſo thick over the body, that if one ſhould attempt to ſeparate it, the ſkin will no where appear uncovered: when it falls, it ſeems broken ſhort near the bottom; ſo that the lower part of the hair remains.

The horns of the female are like thoſe of the male, but they are ſmaller and leſs branching. As in other deer, they ſprout from the points; and alſo are furniſhed with an hairy bark, which ſupports the blood-veſſels, of moſt exquiſite ſenſibility. The rein-deer ſhed their horns, at the latter end of November; and are not completely furniſhed again till towards autumn. The female retains hers till ſhe brings forth.

In Lapland this animal is of the greateſt advantage, where it forms the riches of the inhabitants, ſome of whom poſſeſs herds of a thouſand: their great enemies are the innumerable ſwarms of gnats which infeſt the lower grounds in ſummer, and even drive them from their paſtures to the mountains, where the gnats fear to come becauſe of the cold.

Beſides the gnat, there is a gadfly, no leſs formidable and often fatal. This fly is bred under their ſkins, where the egg has been depoſited the preceding ſummer; and is no ſooner produced than it endeavours to depoſite its eggs in a place ſimilar to that from whence it came. Whenever, therefore, this fly appears over an herd of rein-deer, it terrifies the whole body; they know their enemy; and by toſſing their horns, and running among each other, endeavour to avoid it, or run for ſhelter to the mountains; they have alſo enemies in the beaſts of the foreſt, and have diſeaſes ſome of which are ſudden, contagious, and incurable.

The female brings forth in the middle of May, and gives milk till about the middle of October. Every morning and evening, during ſummer, the herdſman returns to the cottage with his deer to be milked, where the women have previouſly kindled a ſmoky fire, which drives off the gnats, and keeps the rein-deer quiet. The female yields about a pint, then the herdſman drives them back to feed; neither folds nor houſes them, neither provides their ſubſiſtence, nor cultivates their paſture.

Their

Their chief, and almoſt their only food, in winter, is the moſs, which, from its being fed on by this animal, obtains the name of the rein-deer lichen *(lichen rangiferinus)*. This is of two kinds; one white, which covers almoſt all the deſert parts of the country like ſnow; the other black, which covers the branches of the trees. The deer purſue their food, though covered in the deepeſt ſnow, even though its ſurface be frozen: They turn it up with their noſes, like ſwine, for the hide by uſe is hardened in that part.

The rein-deer of this country are of two kinds, wild and tame. The wild are larger and ſtronger, but more miſchievous than the others. No creature can be more active, patient, and willing than the tame; when hard puſhed, they will trot nine or ten Swediſh miles, or between fifty and ſixty Engliſh miles, at one ſtretch: but the poor obedient creature fatigues itſelf to death. In general, they can go about thirty miles without halting, and without danger.

They go with young about eight months and generally bring two. The dam is fond of her young, and often, when they are ſeparated from her, returns from paſture, keeps calling round the cottage for them, and will not deſiſt, till they are brought and laid at her feet. They are at firſt of a light brown, but become darker with age. The old ones almoſt approach to blackneſs. The young follow the dam two or three years; do not acquire their full growth till four; are then broke in, and managed for drawing the ſledge, and continue ſerviceable four or five years longer. Live about fifteen or ſixteen years.

OF THE

MUSK ANIMAL.

MUSK is brought to Europe in ſmall bags, about the ſize of a pigeon's egg, containing a kind of duſky reddiſh ſubſtance, like coagulated blood, which, in large quantities, has a very ſtrong ſmell; but when mixed and diffuſed, becomes a very agreeable perfume. No ſubſtance known has a ſtronger or more permanent ſmell. A grain of muſk perfumes a whole room; and its odour continues ſome days without diminution. In a larger quantity it continues for years, and ſeems ſcarce waſted in weight, though it has filled the atmoſphere to a great

diſtance with its particles. In nervous and hyſteric diſorders, it is found a powerful remedy. The animal that furniſhes this admirable medicine, is known but imperfectly.

The Muſk animal has no horns; wants fore teeth in the upper jaw, the ſame as ruminating animals; but has two tuſks hanging out expoſed. Eight ſmall cutting teeth in the lower jaw. It is three feet ſix inches in length, about two feet three or four inches high. The head is above half a foot long; the fore part of the head is ſomewhat like a greyhound; ears long and narrow, inſide pale yellow, outſide deep brown, partly erect, like thoſe of a rabbit; the tail not two inches; is cloven-footed; hoofs ſlender and black; hair is erect, on the head and legs half an inch long, on the belly an inch and half, on the back and buttocks three inches, and proportionably thicker than in any other animal; is waved brown and white alternately, from the root to the point; on the head and thighs brown, under the belly and tail white, a little curled, eſpecially on the back and belly. On each ſide of the lower jaw, under the corners of the mouth, is a tuft of thick hair, which is ſhort and hard, about three quarters of an inch long. The hair of this animal is ſoft and fine; but what diſtinguiſhes it are the tuſks, which are near two inches long, and turn back in the form of a hook; and, more particularly, the muſk bag, which is about the ſize of a hen's egg, on the belly of the male only: It has two ſmall orifices, one naked, the other hairy. It is a very fearful animal; has the ſenſe of hearing ſo quick, that it can diſcover an enemy at a great diſtance.

The female is leſs than the male, noſe ſharper, wants the two tuſks, and has two ſmall teats. Inhabits the kingdom of *Tibet*, *China*, *Tonquin*, and *Bontan*, from lat. 60 to 45 or 44; but never wanders ſo far ſouth, except forced by ſeverity of the ſeaſon, when they ſeek corn or rice newly grown. Inhabits naturally mountains covered with pines; loves ſolitude; if purſued, ſeeks inacceſſible ſummits. It is extremely probable, that the muſk-bags ſold by the hunters are adulterated, as the greateſt plenty of the animal could ſcarce ſupply the quantity ſold. The fleſh of the animal is infected with the ſcent, but is eaten by the Muſcovites. The Tibet muſk is the beſt; the Ruſſian the worſt. This is not the only animal reſembling the deer, yet without horns. There are others in Brazil and India.

THE

THE

CAMEL AND THE DROMEDARY.

THESE animals are in all reſpects the ſame, except that the camel has but one bunch on his back; the dromedary has two. The camel alſo is the ſtrongeſt and largeſt. The two races produce with each other, and the mixed breed formed between them is conſidered the beſt, the moſt patient, and moſt indefatigable.

The camel has a bunch on the back, ſmall head, little ears, long neck and bending; about ſix feet ſix inches to the top of his bunch; ſoft hair, longeſt about the neck, throat, and bunch; tail long, hoofs ſmall, divided, but not entirely; the ſoal exceſſively tough and pliant; has ſix calloſities on the legs, one on each knee, one on the inſide of each fore-leg on the upper joint, one on the inſide of the hind-leg at the bottom of the thigh, another on the lower part of the breaſt, being the places on which the animal reſts when lying down.

The camel is by far the moſt numerous, and is ſpread over the deſarts of Arabia, Africa, Perſia, Tartary, and great part of the eaſtern Indies, but cannot ſubſiſt, or propagate, in the variable climates towards the north; they ſeem formed for countries where ſhrubs are plenty, and water ſcarce; where they can travel along the ſandy deſart, without being impeded by rivers, and find food at expected diſtances; ſuch a country is the deſart of Arabia, and ſeems moſt adapted to this animal. They have been tranſported to Spain, to America, to Barbadoes, but without effect.

The camel is the moſt temperate of animals, and can travel ſeveral days without drinking. Its feet are formed for travelling upon ſand, and utterly unfit for moiſt or marſhy places; the Arabians, therefore, find a moſt uſeful aſſiſtant in this animal, where no other could ſubſiſt, and by its means croſs thoſe deſarts with ſafety, which would be unpaſſable by any other method of conveyance. If the camel ſhould ſlip, as in moiſt places it might, it would ſplit aſunder under a burden.

The natives could neither ſubſiſt, traffick, or travel without the camel; its milk and fleſh make part of their nouriſhment; its hair, which it ſheds yearly, their clothing; and if they fear an invading enemy, their camels convey them in a ſingle day above an hundred miles. All the

armies upon earth might be loſt in purſuit of a flying ſquadron mounted on camels.

The camel is eaſily inſtructed in the methods of taking up and ſupporting his burthen; their legs, a few days after they are produced, are bent under their belly; they are then loaded, and taught to riſe; their burthen is daily inſenſibly increaſed. Equal care is taken in making them patient of hunger and thirſt: while other animals receive their food at ſtated times, the camel is reſtrained for days together, and theſe intervals of ſcarcity are increaſed in proportion as the animal ſeems capable of ſuſtaining them. Their ſtomach is admirably formed by nature for long abſtinence: beſides the four ſtomachs, common to animals that chew the cud (and the camel is of the number), it has a fifth ſtomach, which ſerves as a reſervoir, to hold a greater quantity of water than the animal has immediate occaſion for. Here the fluid remains without corrupting, or being adulterated by other aliments: when the camel finds itſelf thirſty, it throws up a quantity of this water by a ſimple contraction of the muſcles, into the other ſtomachs, and thus macerates its food.

In Turkey, Perſia, Arabia, Barbary, and Egypt, all commerce is carried on by camels. Merchants and travellers unite in a body, to ſecure themſelves from robbers. This aſſemblage is called a caravan; ſometimes conſiſting of above ten thouſand perſons, and the number of camels often greater. Theſe animals are loaded according to their ſtrength, and of this each is ſo ſenſible, that when overloaded, he remains on his belly, refuſing to riſe, till his burthen be leſſened. Large camels are capable of carrying a thouſand weight, and ſometimes twelve hundred; the dromedary from ſix to ſeven. In trading journeys, they ſeldom go above thirty, or five and thirty miles a day. Every evening, when they arrive at a ſtage, which is uſually ſome ſpot of verdure, they feed at liberty, and eat as much in an hour, as will ſupply them for twenty four; they prefer coarſe weeds, the thiſtle, nettle, caſia, and other prickly vegetables; but their drivers ſupply them with balls of meal, of barley, or beans, as more permanent nouriſhment. Theſe animals, having often gone the ſame track, are ſaid to know their way preciſely, even when their guides are bewildered. When they come within a few miles of their baiting-place, in the evening, they ſagaciouſly increaſe their ſpeed, and often trot with vivacity to their ſtage. They can diſcover water by their ſcent at half a league diſtance, and will haſten towards it, long before their drivers perceive it. They are enlivened

enlivened by the pipe and muſic, and this always forms part of their drivers' profeſſion.

The humps on the back grow large in proportion as the animal is well fed, and are in ſubſtance not unlike the udder of a cow. The female goes with young about a year, and produces but one at a time. Camel's milk is abundant and nouriſhing, and mixed with water makes a principal part of the beverage of the Arabians. They ordinarily live from forty to fifty years.

There is a kind of dromedary which is ſwift, and uſed only to ride on, is trained for running matches, and to carry couriers, who travel an hundred miles a day for nine days together over burning ſands. The African camels are very hardy, and paſs dreadful deſarts from Numidia to Ethiopia.

THE LAMA.

THE Lama may be conſidered as the camel of the new world, and is every way ſmaller than that of the old. Reſembles the camel, not only in its natural mildneſs, but its aptneſs for ſervitude, its moderation, and its patience. The Americans early availed themſelves of its uſeful qualities.

They belong entirely to the new continent; nor are they ſpread over all America, but chiefly among the Andes. They inhabit the higheſt regions of the globe, and ſeem to require the pureſt air. In Potoſi, and other provinces of Peru, where they are numerous, they make the chief riches of their maſters, Indians and Spaniards: their fleſh is excellent food; their hair, or rather wool, forms clothing; and, in the moſt rugged and dangerous ways, they carry burthens of a hundred weight with ſafety. They go about fifteen miles a day; their tread is heavy, but ſure; they deſcend precipices, and find footing among craggy rocks where men can ſcarce accompany them. After four or five days labour, they are obliged to repoſe for a day or two. They are chiefly uſed in carrying the riches of the mines of Potoſi; and we are told that there are above three hundred thouſand of theſe animals in actual employ. Were uſed to plough the land before the introduction of mules.

This

This animal is about the ſize of an aſs, ſome four or four and half feet high, and ſix in length; the neck three feet long, the head is ſmall, its face reſembling a camel, eyes large, noſe long, lips thick, the upper divided, the lower a little depending; like all animals that feed on graſs, wants the upper cutting teeth; the ears four inches long, move with great agility; the tail ſmall, ſtrait, a little turned up at the end; is cloven footed, like the ox, but has a kind of ſpear-like appendage behind, which aſſiſts it in moving over precipices and rugged ways; the wool on the back is ſhort, but long on the ſides and the belly; has ſmooth hair when tame, rough when wild; are moſtly brown, but ſome white, black, or ſpotted.

The lama is extremely moderate in what it drinks, and exceeds even the camel in temperance. Indeed, of all creatures, it ſeems to require water leaſt, as it is ſupplied by nature with ſaliva in ſuch large quantities, that it ſpits it out on every occaſion, and this ſaliva is its only offenſive weapon; wherever it falls on the ſkin, it cauſes an itching and reddiſh ſpot.

Theſe animals are found wild in very great numbers, and exhibit marks of very great force and agility; are in ſhape delicate and ſtrong; colour tawney, wool ſhort; in their native foreſts are gregarious animals, often ſeen in flocks of two or three hundred. When they perceive a ſtranger, they regard him with aſtoniſhment, without marking fear or ſurpriſe; but ſhortly, as if by common conſent, they ſnuff up the air, ſomewhat like horſes, and take refuge on the tops of the mountains: are fonder of the northern than the ſouthern ſide of the Andes; often climb above the ſnowy tracts of the mountain, and ſeem vigorous in proportion to the coldneſs of their ſituation.

The lama ſeems to be the largeſt of the camel kind in America; there are others, called guanacoes and pacos, that are ſmaller and weaker, of the ſame nature and forms. The wool of the paco is formed into ſtuffs, not inferior to ſilk, either in price or beauty. The natural colour of the paco is that of a dried roſe-leaf, or dull purple; the manufacturers ſeldom dye its wool, but form it into quilts and carpets.

OF

OF THE

HOG KIND.

THE hog kind ſeem to unite thoſe diſtinctions by which others are ſeparated. They reſemble the horſe in the number of their teeth, which amount to forty-four, in the length of their head, and in having but one ſtomach. They reſemble the cow in their apparently cloven hoofs, and the poſition of their inteſtines; and they reſemble the rapacious kind in their appetite for fleſh, in their not chewing the cud, and in their numerous progeny. Like them they have ſhort inteſtines; their hoofs alſo, though apparently cloven, on anatomical inſpection, appear formed with bones like beaſts of prey; and the number of their teats increaſes the ſimilitude.

The wild Boar is by no means ſo ſtupid nor ſo filthy, as that reduced to tameneſs; he is ſmaller; his colour an iron grey, inclining to black; his ſnout is much longer than that of the tame hog; ears ſhorter, rounder, and black. He roots up the ground like a furrow, and does irreparable damage in cultivated lands. The tuſks of this animal are large, ſome of them almoſt a foot long. Theſe grow from both the under and upper jaw, bend upwards circularly, and are exceeding ſharp; they never fall; all the hog kind never ſhed their teeth. The tuſks of the lower jaw are moſt to be dreaded, and give very terrible wounds.

The wild boar can properly be called neither ſolitary nor gregarious. The three firſt years the litter follows the ſow, and the family lives together. They are then called beaſts of company, and unite their forces againſt beaſts of prey, calling to each other with a very loud and fierce note; the ſtrongeſt face the danger, and the weakeſt fall into the centre. In this poſition few ravenous beaſts dare attack them. When the wild boar is mature, and conſcious of his ſtrength, he walks the foreſt alone, and fearleſs.

The hog, in a natural ſtate, feeds chiefly on roots and vegetables; ſeldom attacks other animals; but if an animal die in the foreſt, or is ſo wounded that it can make no reſiſtance, it becomes a prey to the hog, who ſeldom refuſes animal food, how putrid ſoever, though never at the pains of taking or procuring it alive. In America, feeds upon rattle ſnakes with ſafety, and is in that reſpect very uſeful.

It is of all quadrupeds moſt delicate in the choice of vegetables, and rejects a greater number than others. The cow, we are aſſured by Linnæus,

næus, eats two hundred and ſeventy-ſix plants, and rejects two hundred and eighteen; the goat eats four hundred and forty-nine, and rejects an hundred and twenty-ſix; the ſheep eats three hundred and eighty-ſeven, and rejects an hundred and forty-one; the horſe eats two hundred and ſixty-two, and rejects two hundred and twelve; but the hog eats only ſeventy-two plants, and rejects an hundred and ſeventy-one. The indelicacy of this animal is, therefore, rather in our apprehenſions than in its nature; for, where it finds variety, it rejects the worſt with as diſtinguiſhing a taſte as any other quadruped whatſoever. In the orchards of peach-trees in North-America, where the hog has plenty, it will reject the fruit that has lain a few hours on the ground, and continue on the watch hours together for a freſh windfall.

The hog is ſtupid, inactive, and drowſy; would ſleep half its time; but is frequently awaked by the calls of appetite, which having ſatisfied, goes to reſt again. Its whole life is ſleep and gluttony, in enjoyment of which it ſoon grows unfit even for exiſtence; its fleſh becomes a greater load than its legs are able to ſupport, and it continues to feed lying down, or kneeling, an helpleſs inſtance of indulged ſenſuality. Is keen of ſmell; its fat diſpoſed different from other animals in a regular coat over the whole body. When the wind blows with vehemence, is greatly agitated, runs violently to its ſty, ſcreaming horribly, which ſeems to indicate that it is naturally fond of a warm climate. It appears alſo to foreſee bad weather, bringing ſtraw in its mouth, preparing a bed, and hiding itſelf from the impending ſtorm. When it hears any of its kind in diſtreſs, gathers round it, to lend fruitleſs aſſiſtance, and to ſympathize with its ſufferings. They have been known to gather round a dog that had teazed them, and kill him on the ſpot. Nevertheleſs, is ſo brutal, as to eat its own offspring, and ſometimes infants.

Moſt diſeaſes of this animal ariſe from intemperance; meaſles, impoſthumes, and ſcrophula. It is thought by ſome that they wallow in the mire to deſtroy a ſort of louſe that infeſts them; rather, perhaps, to cool their ſurfeited body. They generally live eighteen or twenty years; and the females produce till fifteen. As they produce from ten to twenty at a litter, twice a year, they would ſhortly become exceedingly numerous, if not diminiſhed. In the wild ſtate, the ſow brings forth but once a year.

The wild boar was formerly native of our country, as appears from the laws of Hoel Dda, the famous Welch legiſlator, who permitted his grand huntſman to chace that animal from the middle of November to the

the beginning of December. William the Conqueror alſo puniſhed ſuch as were convicted of killing the wild boar in his foreſts, with the loſs of their eyes. At preſent the wild breed is extinct; but no country makes greater uſe of the tame.

This animal is native of almoſt every country, except in the frigid zones and Kamtchatka, and where the cold is very ſevere. Since introduced into America by the Europeans, abounds to exceſs in the hot and temperate parts. The Eaſt-India breed is lower, leſs furniſhed with hair, uſually black, and has the belly almoſt touching the ground; it is now common in England.

There is a remarkable variety of this animal about Upſal, which is ſingle-hooſed, like the horſe; but in no other reſpect differing from the common kinds. The Guinea hog differs alſo in ſome things from our own.

I have ſeen in the poſſeſſion of an officer, who had ſerved in the Eaſt-Indies, drawings of a pair of creatures exactly reſembling hogs, except that they had only two legs, their hinder parts being held up in the air, as it were. They are natives of Ceylon, and were ſent from thence to a Rajah (I believe) of Tanjore, where they were drawn. They walk with difficulty, and are not eaſily induced to riſe.

Theſe we conſider as of the hog kind; there are other quadrupeds reſembling this ſpecies, but very diſtinct, notwithſtanding their general form or habits.

THE

AFRICAN WILD BOAR

DIFFERS from that of Europe, eſpecially by its head; which is enormouſly large; has two tuſks in the lower jaw, and two very large in the upper, riſing almoſt perpendicular, near ſeven inches long. The under tuſks exactly meet the upper when the mouth is ſhut. The head is flat in front, and ends in a conſiderable breadth of ſnout, almoſt of a horny hardneſs, with which he roots the earth; no fore teeth; his eyes are placed on the fore part of his head, ſo that he can only ſee before him. Beneath them is a very wrinkled kind of hollow, formed of looſe ſkin; ſomewhat lower, the ſkin riſes, and forms on each ſide an excreſcence, which at a little diſtance reſembles ears in ſize and figure, broad, flat, rounded at the end, lying almoſt in the ſame direction as the face, intercepting the view of every thing below from the animal;

between the excreſcences and the tuſks, is a large callous protuberance on each ſide the face; ears large and ſharp pointed, well lined with long whitiſh hairs; tail naked, ſlender, and flat, not very long; hoofs divided; general colour blackiſh; grows to an enormous ſize; capable of tameneſs, in ſome degree at leaſt, but irritable and capricious; naturally very ſwift and fierce; will not breed with the common ſort; inhabits the hotteſt parts of Africa; little of its native manners known.

THE

PECCARY, OR TAJACU.

THE Peccary, or Tajacu, is native of America and the Antilles, found in herds of ſeveral hundreds together, grazing among the woods; inoffenſive except when offended.

The peccary reſembles a ſmall hog in the form of its body, the ſhape of its head, the length of its ſnout, and the form of its legs; but the body is not ſo bulky, its legs not ſo long, its briſtles much thicker and ſtronger than thoſe of the hog, leſs reſembling hair than the quills of a porcupine, but are not near ſo thick; are alſo variegated like the porcupine's. Inſtead of a tail, it has only a little fleſhy protuberance, which does not even cover its poſteriors. It differs from all other quadrupeds by having on its back a lump reſembling the navel in other animals, which ſeparates a liquor of a very ſtrong ſmell. This lump, ſituated on the hinder part of the back, is, in general, ſo covered with long briſtles, that it cannot be ſeen except they be drawn aſide. A ſmall ſpace then appears, only beſet with a few ſhort fine hairs. In the middle it riſes, and has an orifice capable of receiving a gooſe quill, about an inch in depth; round it, under the ſkin, are ſituated a number of ſmall glands, which diſtil a whitiſh liquor, in colour and ſubſtance reſembling that obtained from the civet animal; but offenſive. While ſome creatures have theſe glands under the belly, or under the tail, the peccary has them on its back.

The belly is almoſt bare; the briſtles on the ſides gradually increaſe in length, as they approach the ridge of the back, where ſome are five inches long. On the head, between the ears, is a large tuft of briſtles, chiefly black; ears are about two inches and a half long, ſtanding upright; the eyes reſemble thoſe of a common hog, but ſmaller; the ſnout

is

is like a hog's, though ſmall. One ſide of the lower lip is generally ſmooth, by the rubbing of the tuſk of the upper jaw. The feet and hoofs are perfectly like thoſe of a common hog.

The peccary may be tamed like a hog, and has pretty nearly the ſame habits and natural inclinations; feeds upon the ſame aliments; its fleſh, though drier and leaner than that of the hog, is pretty good eating; and, when killed, not only the parts of generation muſt be taken inſtantly away, but alſo the lump on the back, with all the glands that contribute to its ſupply. If this operation be deferred only half an hour, the fleſh becomes utterly unfit to be eaten.

They are particularly fierce when their young are aſſaulted; they ſurround the plunderer, attack him boldly, and frequently make his life pay the forfeit of his raſhneſs. When any of the natives are purſued by a herd, they climb a tree to avoid them; the peccaries gather round it; by threatening with their tuſks, and erecting their rough briſtles (as hogs) they aſſume a very terrible appearance. Thus they remain at the foot of the tree hours together, while the hunter is obliged to wait patiently, and not without apprehenſions, till they retire.

The peccary is fond of mountain-foreſts (not of marſhes or the mud, like our hogs); it ſubſiſts on wild fruits, roots, and vegetables; is an unceaſing enemy to the lizard, toad, and ſerpent, with which theſe uncultivated foreſts abound. As ſoon as it perceives a ſerpent, it ſeizes it with its fore hoofs and teeth, ſkins it in an inſtant with great dexterity, and devours the fleſh. The jaguar is its mortal enemy, but often feels the force of their union. It is ſaid there are two ſorts of peccary; one large—the other ſmall, and no enemy to marſhes or mud, out of which it draws worms and inſects.

The peccary is very prolific; the young ones follow the dam till they come to perfection. If taken at firſt, ſoon loſe their natural ferocity; never ſhew any remarkable ſigns of docility, but continue ſtupid and rude, without attachment, or ſeeming to know the hand that feeds them. They ſeldom ſtray far from home; return of themſelves to the ſty; and do not quarrel among each other, except when fed in common. At ſuch times have an angry kind of growl, much ſtronger and harſher than that of an hog, but are ſeldom heard to ſcream like the former; ſometimes, when frighted or irritated, they have an abrupt angry manner of blowing like the boar.

The peccary is very diſtinct from the hog, and will not mix with it.

The Warree is the European hog, degenerated into a wild ſtate in the foreſts of America.

THE

BABYROUESSA, OR INDIAN HOG.

THIS animal's figure, on the whole, moſt reſembles that of the hog; has four cutting teeth in the upper, ſix in the lower jaw. Its legs are longer, its body more ſlender than a hog; its hair is finer, blackiſh, rather reſembling wool than briſtles, but along its back are ſome weak briſtles; its tail is long, and alſo tufted with the ſame, often twiſted; ears ſmall, erect, ſharp pointed. What principally diſtinguiſh it, are four tuſks; the two largeſt (about twelve inches long) from the upper, the two ſmalleſt (about eight inches) from the under jaw. The jaw-bones of this extraordinary animal are very thick and ſtrong, from whence theſe monſtrous tuſks proceed; they bend circularly, the two lower like thoſe of the boar, the two upper riſe from the upper jaw, rather like horns than teeth; and, bending upwards and backwards, ſometimes have their points directed to the animal's eyes, and ſometimes grow into them. The tuſks in both jaws are of a very fine ivory, ſmoother and whiter than that of the elephant, but not ſo hard or ſerviceable.

Theſe enormous tuſks give this animal a very formidable appearance; yet it is thought to be much leſs dangerous than the wild boar. They go together in herds; often in company with the wild boar, with which, however, they are never known to engender; have a very ſtrong ſcent, which diſcovers them to the hounds; and, when purſued, they growl dreadfully, often turning back upon the dogs, and wounding them with the tuſks of the lower jaw, for thoſe of the upper are rather an obſtruction than a defence. They run much ſwifter than the boar; have a more exquiſite ſcent, winding the men and the dogs at a great diſtance. When hunted cloſely, they generally plunge themſelves into the ſea, where they ſwim with great ſwiftneſs and facility, diving, and riſing again at pleaſure; fierce when offended; peaceable and harmleſs when unmoleſted. They are eaſily tamed; their fleſh good, but ſaid to putrefy in a very ſhort time. They repoſe themſelves by hitching one of their upper tuſks on the branch of a tree; live upon vegetables and the leaves of trees; never break into gardens, like other ſwine; inhabit near Amboyna and Celebes.

THE

THE

DOG KIND

MAY be diſtinguiſhed by their claws, which have no ſheath, like thoſe of the cat kind, but are incapable of extenſion or retraction; noſe and jaw long; body ſtrongly made, covered with hair inſtead of fur; the inteſtines much longer in the dog than in the cat kind; the eye not formed for night viſion; the olfactory nerves diffuſed on a very extenſive membrane within the ſcull. They cannot, like cats, purſue their prey up trees, and among the branches, as their claws cannot ſtick in the bark; but their proper prey are animals like themſelves, unfitted for climbing; the hare, rabbit, gazelle, or roebuck. By their ſenſe of ſmelling, they purſue their prey with certainty, wind it through all its mazes, and tire it down by perſeverance. When driven to extremity, the dog kinds can live for ſome time on fruits and vegetables.

Of all the tribe, the Dog claims the preference, as the moſt intelligent of quadrupeds, and our acknowledged friend. Independent of his beauty, vivacity, force, and ſwiftneſs, the dog poſſeſſes internal qualifications to conciliate our eſteem. To pleaſe ſeems to be his ambition; he comes crouching to lay his force, courage, and talents, at the feet of his maſter; waits his orders, to which he pays implicit obedience; conſults his looks, and a ſingle glance puts him in motion; he is faithful and conſtant; friendly and grateful; much more mindful of benefits than of injuries; is not driven off by unkindneſs; he licks the hand juſt lifted to ſtrike him, and diſarms reſentment by ſubmiſſive perſeverance; docile and obedient, he is quickly inſtructed, and conforms to the diſpoſitions and manners of his maſters; like the domeſtics, is diſdainful among the great, churliſh among clowns: aſſiduous in ſerving his maſter, and only a friend to his friends; knows a beggar by his clothes, his voice, or his geſtures, and forbids his approach. When at night the guard of the houſe is committed to his care, ſeems proud of the charge; continues a watchful centinel, goes his rounds, ſcents ſtrangers at a diſtance, and gives them warning of his being upon duty. If they aſſault his territories, he becomes fierce, flies at them, threatens, fights, and, when he has conquered, quietly abſtains from what he has deterred others from abuſing: at once an example of courage, temperance, and fidelity.

Without the dog, how could man have been able to conquer and domeſticate other animals? How could he diſcover and chaſe thoſe noxious to him? The firſt art of man was to conciliate the favour of the dog; and the fruits of this art were, the conqueſt and peaceable poſſeſſion of the earth. The generality of animals have ſuperior agility, ſwiftneſs, or arms, than man; their ſenſes, particularly ſmelling, are ſuperior. The acquiſition, therefore, of an aſſiſtant, eſpecially one whoſe ſcent is ſo exquiſite, was gaining a ſenſe which before was wanting.

The dog, thus taken into office, exerts a ſuperiority over all animals under human protection. The flock and the herd obey him; he conducts them, guards them, and conſiders their enemies as his own. When the ſound of the horn, or the voice of the huntſman, calls him to the field, he purſues with pleaſure and perſeverance. All animals that live on fleſh hunt by nature; the lion and the tiger, ſure to conquer, hunt alone; the wolf, the fox, the wild dog, hunt in packs; but the domeſtic dog, when he has been taught by man, hunts with method, and with ſucceſs.

The wild dog is at preſent unknown; yet there are many that, from a domeſtic ſtate, have returned to wildneſs (or rather are without maſters), and entirely purſue the dictates of nature; of theſe it is aſſerted, that when they have run down an animal, they ſtill preſerve ſo much reſpect for mankind, as to ſuffer part to be taken away without growling. Multitudes wild in Africa and South-America; they unite in large bodies, and attack the moſt formidable animals of the foreſt, the cougar, the panther, and the biſon; even man himſelf does not paſs without inſult. But they are eaſily tamed; when taken home, and treated with kindneſs and lenity, they quickly become ſubmiſſive and familiar, and continue faithfully attached to their maſters. Different in this from the wolf or the fox, who, though taken never ſo young, are gentle only while cubs, and, as they grow older, obey their natural appetites of rapine. In ſhort, the dog is the only animal whoſe fidelity is unſhaken; who knows his maſter and his friends; who inſtantly diſtinguiſhes a ſtranger; who knows and anſwers to his name; who ſeems to underſtand the nature of ſubordination, and ſeeks aſſiſtance; who, when he miſſes his maſter, teſtifies his loſs by complaints; who, carried to a diſtance, can find the way home. The only animal whoſe natural talents are always ſucceſsfully improved by education.

The varieties of this animal are too many for the moſt careful deſcriber to mention. Climate, food, education, produce alterations in

ſhape, colour, hair, ſize, and in every thing but its nature. Nothing appears conſtant, but internal conformation, and a capacity of producing among each other, through all their varieties, which determines the identity of the ſpecies, and approximates forms that at firſt ſight ſeem never made for conjunction.

Which is the original animal is a queſtion not eaſily ſolved. Probably that which moſt nearly approaches the wolf or the fox externally; for as the dog nearly reſembles them internally, his external reſemblance may naturally approach them alſo, except where art or accident has altered his form.

On this principle, we ſelect that which is called the Shepherd's Dog, with long coarſe hair, except on the noſe, a long noſe and pricked ears, which is common among us, and uſed in attending on ſheep. If we examine countries ſtill ſavage, or but half civilized, where the dog, like his maſter, has received few impreſſions from art, we find this dog, or one very like him, prevailing among them. Dogs that have run wild in America, and in Congo, approach this form. The dog of Siberia, Lapland, and Iceland, of the Cape of Good Hope, of Madagaſcar, Madura, Calicut, and Malabar, reſembles the ſhepherd's dog. In Guinea, the dog ſpeedily takes this form; and, at the ſecond or third generation, forgets to bark, his ears and his tail become pointed, his hair drops off, and a coarſer thinner kind ſucceeds it. Notwithſtanding this creature's melancholy and ſavage air, he is ſuperior to all of his kind in inſtinct; and, without teaching, naturally takes to tending flocks, with aſſiduity and vigilance.

The ſhepherd's dog, in temperate climates, and among people entirely civilized, will loſe his ſavage air, his pricked ears, his rough, long, and thick hair, and by the influence of climate and food become either a Matin, a Maſtiff, or a Hound.

The Hound, the Harrier, and the Beagle ſeem of one kind; for in the litters of a bitch covered by one, are found puppies reſembling all three. This animal, tranſported into Spain or Barbary, where the hair of all quadrupeds becomes ſoft and long, will be converted into the land-ſpaniel and the water-ſpaniel.

The Grey Matin Hound (the ſecond branch) tranſported to the north, becomes the great Daniſh dog; this, ſent into the ſouth, becomes the grey-hound of different ſizes; tranſported into Ireland, the Ukraine, Tartary, Epirus, and Albania, becomes the great wolf-dog.

The Maſtiff (the third branch) chiefly a native of England, when tranſported into Denmark, becomes the little Daniſh dog; which, in tropical and warm climates, becomes the Turkiſh dog without hair. Theſe races, with their varieties, are produced by the influence of climate, food, and education.

Mixed kinds are ſo extremely numerous, and different in different countries, it would be endleſs to mention them. In our own country the varieties are very great, and daily increaſing. In the time of queen Elizabeth, Dr. Caius attempted their natural hiſtory. Some he mentions are no longer found among us, many others are ſince introduced.

He divides dogs into three kinds. Firſt, the generous kind, including the tarrier, the harrier, and the blood-hound; the gaze hound, the greyhound, the leymmer, and the tumbler; theſe are uſed for hunting. The ſpaniel, the ſetter, the water-ſpaniel, or finder, for fowling; and the ſpaniel gentle, or lap-dog, for amuſement. Secondly, the farm kind, conſiſting of the ſhepherd's dog and the maſtiff. Thirdly, the mongrel kind, conſiſting of the wappe, the turn-ſpit, and the dancer. To theſe we may now add, the bull-dog, the Dutch maſtiff, the harlequin, the pointer, and the Dane, with a variety of uſeleſs lap-dogs.

The Tarrier is a ſmall kind of hound, with rough hair, uſed to force the fox or the badger out of their holes; or rather to give notice by their barking, in what part of their kennel the fox or badger reſides, when the ſportſmen intend to dig them out.

The Harrier, as well as the Beagle and the Fox-hound are uſed for hunting; of all animals, they have the acuteſt ſenſe of ſmelling.

The Blood-hound was of great uſe, and high eſteem among our anceſtors, for recovering game that had eſcaped wounded, or had been killed, and ſtolen; and for hunting thieves and robbers by their footſteps.

The Gaze-hound hunted, like our grey-hounds, by the eye only; chaſed the fox, hare, or buck; would ſelect the fatteſt and faireſt, and, if loſt, recover it again with amazing ſagacity. This ſpecies is now unknown.

The Grey hound, well known at preſent, was formerly the peculiar companion of a gentleman; who, in the times of ſemi-barbariſm, was known by his horſe, his hawk, and his grey-hound.

The Leymmer is a ſpecies now unknown. It hunted both by ſcent and ſight, and was led in a leyme or thong, from whence it received its name.

The

The Tumbler, leſs than the hound, ſcraggy, and had pricked ears, ſeems to anſwer to the lurcher. This took its prey by mere cunning.

The Land-Spaniel (probably named from Spain, where it might acquire the ſoftneſs of its hair) is well known. There are two varieties; the Starter, uſed in hawking to ſpring game, and the Setter, that crouches down when it ſcents the birds, till the net be drawn over them, an amuſement known only in England.

The Water-Spaniel was another ſpecies uſed in fowling.

The Shepherd's Dog has been mentioned, and the Maſtiff is too common to require deſcription.

The Bull-Dog, Mr. Buffon ſuppoſes, is bred between the ſmall Dane and the Engliſh maſtiff. The large Dane is the talleſt dog generally bred in England.

Of thoſe of the foreign kinds, the Lion Dog greatly reſembles that animal, in miniature. The hair on the fore part of the body is extremely long; on the hinder part ſhort. The noſe is ſhort, the tail long and tufted. In theſe particulars entirely like the lion. It comes originally from Malta, where it is ſo ſmall, that women carry it about in their ſleeves.

That falſely called the Turkiſh Dog, differs in being entirely without hair. The ſkin is of a fleſh colour, with brown ſpots, and their figure at firſt view rather diſguſting. They are extremely chilly, unable to endure our climate, and in the midſt of ſummer always ſhivering; in winter their ſpots entirely diſappear.

The Great Iriſh Wolf-Dog may be conſidered as the firſt of the ſpecies in regard to ſize, being ſometimes four feet high, or as tall as a calf of a year old; made like a greyhound, but rather more robuſt.

In China are dog-butchers, and ſhambles appointed for ſelling their fleſh. In Canton particularly; and wherever a dog-butcher appears, all the dogs of the place follow him in full cry, and perſecute him as far as they are able.

The dog, when whelped, is not complete, the eyes being cloſed by a kind of thin membrane, which is torn as ſoon as the upper eye-lid becomes ſtrong enough to raiſe it, which in general requires ten or twelve days. During that time, the bones of the ſcull are not completed, the body is puffed up, and the noſe ſhort. In leſs than a month the puppy begins to uſe its ſenſes, and makes haſty advances. At the fourth month the dog loſes ſome of his teeth, which are renewed by ſuch as never fall. Theſe amount to forty-two. The teeth of the dog being his great

great and only weapon, are formed in the moſt ſerviceable manner. He cuts with his inciſors, or fore-teeth, he holds with his four great canine teeth, and he chews with his grinders; theſe are fourteen in number, and ſo placed that, when the jaws are ſhut, there remains a diſtance between them, ſo that the dog, by opening his mouth ever ſo wide, does not loſe the power of his jaws. The bitch goes nine weeks with young; lives to about twelve years. Will not eat many kinds of birds; is voracious, yet can bear hunger long; drinks often, though not abundantly; and it is commonly believed, that when abridged in water, he runs mad; but perhaps not ſo often as has been aſſerted.

THE WOLF.

THE Dog and the Wolf are very much alike internally, and externally ſome dogs rather reſemble the wolf than each other.

The wolf is about three feet ſeven inches long, and about two feet five inches high; which ſhews him to be larger than our maſtiffs. His colour a mixture of black, brown, and grey, extremely rough and hard, mixed toward the roots with a kind of aſh-coloured fur. He appears ſtronger than the dog; and the length of his hair contributes to this effect. The wolf's eye opens ſlantingly upwards, in the direction of the noſe; whereas, in the dog, it opens more at right angles with the noſe, as in man; his tail alſo is long and buſhy, and he carries it rather more between his hind legs than the dog. The wolf's eye-balls are fiery green, and add to the fierce and formidable air of his viſage.

The wolf's appetite for animal food is moſt vehement. Nature has furniſhed him with ſtrength, cunning, agility, and all requiſites for purſuing, overtaking, and conquering; yet, with all theſe, the wolf moſt frequently dies of hunger, for he is the declared enemy of man. He is naturally dull and cowardly; but, frequently diſappointed, and reduced to famine, he becomes ingenious from want, and courageous from neceſſity. When preſſed with hunger, he ſallies forth over the country, keeps peering round the villages, carries off ſuch animals as are not under protection, attacks the ſheep-folds, ſcratches up and undermines the threſholds of doors where they are houſed, and deſtroys all before he fixes on and carries off his prey. When theſe ſallies fail, he returns to the thickeſt part of the foreſt to purſue ſmaller animals, which, when taken,

The Black Wolf

taken, afford him but a ſcanty ſupply. He there goes regularly to work, follows by the ſcent, opens to the view, ſtill keeps following, if hopeleſs himſelf of overtaking, expecting that ſome other wolf will come to his aſſiſtance, and then content to ſhare the ſpoil. At laſt, when his neceſſities are very urgent, he boldly faces certain deſtruction; he attacks women and children, ſometimes men; becomes furious by continual agitation, and ends his life in madneſs.

The wolf apparently reſembles the dog; yet only offers the reverſe of the medal. If his form be like, his nature is different; he preſerves the ill qualities of the dog, without any of his good ones. No two animals can have a more perfect antipathy to each other. A young dog ſhudders at the ſight of a wolf; he even ſhuns his ſcent, which, though unknown, is ſo repugnant to his nature, that he comes trembling to take protection near his maſter. A dog who is ſtronger, and knows his ſtrength, briſtles up and teſtifies his animoſity, attacks him with courage, and exerts his abilities to rid himſelf of a hateful preſence. They never meet without animoſity, fighting for life and death, and without mercy on either ſide. If the wolf is the ſtronger, he devours his prey: the dog contents himſelf with victory, leaving his enemy, when he falls, as food for birds of prey, or for other wolves, ſince they devour each other; when one wolf is deſperately wounded, the reſt track him by his blood, and complete his diſaſter.

Dogs, of the dulleſt kinds, ſeek company; but the wolf is the enemy of all ſociety, even among thoſe of his kind; their aſſociation is not ſociety, but a combination for war: their loud howlings and fierceneſs diſcover a project for attacking ſome great animal, a ſtag or a bull, or ſome more redoubtable watch-dog. The inſtant their military expedition is completed, their ſociety ends, and each returns in ſilence to his ſolitary retreat. There are but ſlight attachments between the male and female; they ſeek each other but once a year, and remain together but a few days; they couple in winter; ſeveral males often follow one female, and this aſſociation is ſtill more bloody than the former; they diſpute moſt cruelly, growl, bark, fight, and tear each other; and ſometimes the majority kill that wolf which has been chiefly preferred by the female.

The time of pregnancy is about three months and a half; young wolves are found from the latter end of April to the beginning of July. The long continuance of the wolf's pregnancy adds a diſtinction between it and the dog. They generally bring five or ſix, ſometimes nine

cubs, with the eyes cloſed; the dam ſuckles them ſome weeks, and teaches them betimes to eat fleſh, which ſhe prepares for them, by chewing it firſt herſelf. Some time after ſhe brings them ſtronger food, hares, partridges, and birds yet alive. The young wolves begin by playing with them, and end by killing them. The dam then ſtrips them of their feathers, tears them in pieces, and diſtributes them. They do not leave the den till they are ſix weeks or two months old. When they are about ten or twelve months old, have ſhed their firſt teeth, and completed the new, ſhe thinks them able to ſhift for themſelves. She hides the place of her retreat from the male, leſt he ſhould devour her cubs.

The wolf grows grey by age, and his teeth wear by uſing. He ſleeps when ſatisfied or fatigued, rather by day than night; and always is very eaſily waked. He drinks frequently; though very voracious, ſupports hunger for a long time, and often lives four or five days without food, provided he be ſupplied with water; to allay hunger will eat mud. He carries off a ſheep in his mouth without letting it touch the ground, and runs with it much ſwifter than the ſhepherds who purſue him; ſo that only the dogs can overtake and oblige him to quit his prey. He bites cruelly, always with greater vehemence in proportion as he is leaſt reſiſted; for he uſes precautions where he meets defence. He is ever cowardly, and never fights but by neceſſity. When wounded by a bullet, he ſcreams; yet, when ſurrounded by the peaſants, and attacked with clubs, he defends himſelf in ſilence, and dies as hard as he lived.

He travels, runs, and plunders, days and nights together; is indefatigable; and perhaps of all animals the moſt difficult to be hunted down. If caught in a pit-fall, he is for ſome time ſo frightened and aſtoniſhed, that he may be killed, or taken alive, without much danger; may be collared, muzzled, and dragged along ſafely. At all other times he has his ſenſes in great perfection; his eye, his ear, and (particularly) his ſmelling. He ſmells a carcaſe at more than a league's diſtance. When he leaves the wood, he takes care to go out againſt the wind; at its extremity, he examines, by his ſmell, on all ſides, emanations of his enemy or his prey, which he nicely diſtinguiſhes. He prefers animals which he kills himſelf, to thoſe he finds dead; yet he does not diſdain theſe when without better. He is particularly fond of human fleſh, and perhaps, were he ſufficiently powerful, would eat no other. Geſner tells us of a friar, a woman, and a wolf, being taken in a pit-fall in the

the ſame night. The woman loſt her ſenſes with the fright, the friar his reputation, and the wolf his life.

King Edgar is ſaid to be the firſt who attempted to rid this kingdom of ſuch diſagreeable inmates, by commuting the puniſhment for certain crimes into the acceptance of a number of wolf's tongues or heads from each criminal. However, ſome centuries after, theſe animals were again increaſed to ſuch a degree, as to become a public nuiſance. Edward the Firſt iſſued out his mandate to Peter Corbet to ſuperintend and aſſiſt in their deſtruction. They are ſaid to have infeſted Ireland long after they were extirpated in England.

Beſide the common wolves in France and Germany, there are others with thicker hair, inclining to yellow. Theſe are more ſavage and leſs noxious, neither approaching the flocks nor habitations, and living rather by the chace than rapine. In the northern climates are found ſome quite black, and ſome white all over. The former are larger and ſtronger than thoſe of any other kinds.

The ſpecies is very much diffuſed in every part of the world, being found in Aſia, Africa, and in America, as well as Europe. The wolves of Senegal reſemble thoſe of France, except that they are larger and much fiercer than thoſe of Europe. They prey in company with the lion. Thoſe of Egypt are ſmaller than thoſe of Greece. In the Eaſt, the wolf is trained up for a ſhew, being taught to dance and play tricks; one thus educated often ſells for four or five hundred crowns. It is ſaid, that in Lapland the wolf will never attack a rein-deer that is haltered; the wary animal, being well acquainted with the nature of a trap, ſuſpects one wherever he perceives a rope. However, when he ſees the deer at liberty, he ſeldom fails to deſtroy it.

The wolf of North-America is blacker and much leſs than others, and approaches nearer to the dog. In fact, they were uſed as ſuch by the natives, till the Europeans introduced others; and even now, on the remoter ſhores, or the more inland parts, they uſe theſe animals in hunting. They are tame and gentle; and the wild ones of this kind neither ſo large nor fierce as an European wolf, nor do they attack mankind. They go in large packs by night to hunt the deer, which they do as well as any dogs in England; and it is confidently aſſerted that one of them can run down a deer; do not bark, but uſe a kind of howl. Cateſby ſays, they have engendered with the European dogs, and that their breed has become prolific; which proves them to be of the ſame ſpecies. Similar facts have occurred in London.

The Mexican wolf has a very large head, great jaws and teeth, and is a voracious animal.

Wolf's fleſh is very indifferent, and ſeems to be diſliked by all other animals, no creature being known to eat it, except a wolf. He breathes a moſt fœtid vapour from his jaws, as his food is indiſcriminate, often putrid, and ſeldom cleanly. In ſhort, every way offenſive, by a ſavage aſpect, a frightful howl, an inſupportable odour, a perverſe diſpoſition, and fierce habits, he is hateful while living, and uſeleſs when dead.

THE FOX.

THE Fox is ſlenderer than the wolf, and not near ſo large; about two feet three inches high. The tail of the fox is longer in proportion, and more buſhy; its noſe ſmaller, and hair ſofter; its eyes hazel, obliquely ſituated like thoſe of the wolf, and its ears are directed in the ſame manner; its head is equally large in proportion to its ſize. It has a ſtrong offenſive ſmell peculiar to the ſpecies, and often the cauſe of their death.

The fox has ever been famous for cunning and art, not without meriting his reputation. Not attempting to oppoſe the dogs or the ſhepherds, neither attacking the flock, or alarming the village, he gains by his addreſs what is denied to his ſtrength or courage. Patient and prudent he waits opportunity, and varies his conduct. His ſtudy is ſelf-preſervation; nearly as indefatigable, actually ſwifter than the wolf, he does not truſt to theſe qualities, but retires, in caſe of neceſſity, to an aſylum, where he avoids danger, and brings up his young.

A home ſuppoſes a ſuperior degree of inſtinct; the choice of ſituation, the art of making it convenient, of ſecuring and concealing it, are marks of ſuperior ſkill. The fox generally keeps his kennel, which is often a badger's hole, at the edge of a wood, within an eaſy journey of ſome neighbouring cottage. Thence he liſtens to the crowing cock and the cackling fowls. He ſcents them, ſeizes his opportunity, conceals his approaches, creeps ſlyly along, and ſeldoms returns without his booty. In a yard he levels all the poultry, carries off part of the ſpoil, hides it at ſome convenient diſtance, and again returns to the charge. He hides others alſo, but not in the ſame place; and this for ſeveral

times together. When he finds birds entangled in ſpringes, the fox is beforehand, very expertly takes the bird out of the ſnare, hides it three or four days, and knows exactly when and where to return to his hidden treaſure. He is equally alert in ſeizing young hares and rabbits, and if old ones are wounded or fatigued, he is ſure to profit by their moments of diſtreſs. He finds out birds neſts, ſeizes the partridge and the quail ſitting, and deſtroys a large quantity of game. In ſhort, nothing comes amiſs; rats, mice, ſerpents, toads, and lizards. When urged by hunger, he will eat vegetables and inſects. Thoſe near the ſea-coaſts eat crabs, ſhrimps, and ſhell-fiſh. The hedge-hog vainly rolls itſelf into a ball; this determined glutton teizes it till it unrolls, and then devours it. He attacks the waſp and the wild bee with equal ſucceſs; at firſt they oblige their invader to retire, but in a few minutes he has rolled himſelf on the ground, and cruſhed ſuch as ſtick to his ſkin, he then returns to the charge, and by perſeverance, obliges them to abandon their combs, which he greedily devours, both wax and honey.

His ſcent is ſtrong, but ſoon evaporated. His ſhifts to eſcape, when retreat is cut off to his kennel, are various and ſurpriſing. He chooſes the moſt woody country, and takes the paths moſt embarraſſed with thorns and briars; flies in a direct line before the hounds, though at no very great diſtance; manages his ſtrength; takes to the low and plaſhy grounds, where the ſcent will leaſt lie; and, when overtaken, defends himſelf with a deſperate obſtinacy, and fights in ſilence to the very laſt.

The fox's litter is generally from four to ſix. The female goes with young about ſix weeks, ſeldom ſtirs out while pregnant, but makes a bed for her young, and uſes every preparation. If her retreat is diſcovered, and her young diſturbed during her abſence, ſhe removes them one after the other in her mouth. The cubs are born blind, are eighteen months or two years in coming to perfection, and live about twelve or fourteen years.

The fox makes and ſuffers general war. The dog hunts him with peculiar acrimony; the wolf purſues him to his very retreat; the birds attend his excurſions, and give warning of their approaching danger. The daw, the magpye, and the black-bird, perching on the hedges as he creeps below, with their cries apprize other animals; a caution which they perfectly underſtand and practiſe.

The generality of the foxes are red; but there are ſome, though not in England, greyiſh.

The

The greyhound fox is the largeſt, talleſt, and boldeſt, and will attack a grown ſheep. The maſtiff fox is leſs, but more ſtrongly built. The cur fox is the leaſt and moſt common; he lurks about hedges and outhouſes, and is the moſt pernicious.

Around the pole, the foxes are of all colours; black, blue, grey, iron-grey, ſilver-grey, white, white with red legs, white with black heads, white with the tip of the tail black, red with the throat and belly entirely white, and laſtly with a ſtripe of black running along the back, and another croſſing it at the ſhoulders. The common kind is generally diffuſed, being found in Europe, in the temperate climates of Aſia and America; but rarely in Africa and under the torrid zone. Blue fox ſkins are bought with avidity from their ſcarceneſs; but the black fox ſkin is moſt eſteemed, a ſingle ſkin often ſelling for forty or fifty crowns. The hair of theſe is ſo diſpoſed, that it is impoſſible to tell which way the grain lies; if we hold the ſkin by the head, the hair hangs to the tail; if we hold it by the tail, it hangs down equally ſmooth to the head.

THE JACKALL

IS ſaid to be the ſize of a middling dog, reſembling the fox in the hinder parts, particularly the tail; and the wolf in the fore-parts, eſpecially the noſe. Its legs are ſhorter than thoſe of the fox, and its colour a bright yellow or ſorrel.

The ſpecies is diffuſed over Aſia and Africa, as it were a ſubſtitute for the wolf, where that is not common. There ſeem to be many varieties; thoſe of the warmeſt climates are largeſt, and their colour rather a reddiſh brown, than that beautiful yellow of the ſmaller jackall.

Its cry is a howl, mixed with barking, and a lamentation reſembling that of human diſtreſs. It is noiſy and voracious; goes always in a pack of forty or fifty, ſometimes two hundred; hunt from evening to morning; nothing can eſcape them; they deſtroy the ſmaller animals, yet united, have courage to face the largeſt. Very little afraid of mankind, they purſue their game to the very doors, and will deſtroy children. They enter the ſheep-folds, yards, and ſtables, when they can find nothing elſe, deſtroy leather harneſs, boots, and ſhoes, and run off with what they have not time to ſwallow. They ſcratch up with their feet

feet new-made graves, and devour the corpſes how putrid ſoever; to prevent which, the earth over the graves is mixed with thorns. While they are at this dreary work, they exhort each other by a cry, reſembling that of children under chaſtiſement. When they have dug up a body, they ſhare it. When they have once taſted human fleſh, ever after purſue mankind: They watch burying-grounds, follow armies and caravans. To theſe vultures of quadrupeds, every thing that once had life ſeems equally agreeable.

The jackall that firſt ſcents ſome larger beaſt, gives notice by a howl, which it repeats as it runs; while all within hearing join the chace and cry, which is ſo loud, people can ſcarce hear each other ſpeak. Often the lion, the tiger, or the panther, follow in ſilence at ſome diſtance: The jackall purſues the whole night, keeps up the cry, and with perſeverance tires down its prey; juſt at that moment in comes the lion or the leopard, and the jackall muſt be content with the remnant he leaves. Between the jackall and dog is an irreconcileable antipathy, and they never part without an engagement. The jackall is as ſtupid as impudent; if one has ſtolen ſilently into an out-houſe, to ſeize the poultry, hearing others at a diſtance, it anſwers the call, and betrays its own depredations.

THE

ISATIS, OR ARCTIC FOX,

MAY be conſidered as between the dog and the fox. Reſembles a fox in its form and length of tail; and a dog, in its head, the poſition of its eyes, and its barking. The hair is ſoft, ſome blue, ſome white at one ſeaſon, at another ruſſet brown. Its hair is two inches long, thick, tufted, and gloſſy, yet the under jaw is bare and without any.

This animal can bear only the coldeſt climates, the coaſts of the Icy ſea, and the great rivers around it; is moſtly found in the mountainous and naked regions of Norway, Siberia, and Lapland. Burrows like the fox; ſometimes two or three in a hole, in Groenland; when with young, the female retires to her kennel in the ſame manner. Theſe holes, which are very narrow and extremely deep, have many outlets, are kept very

clean, and bedded with moſs. Its time of geſtation and number of young are ſimilar to the fox; brings forth in May or June.

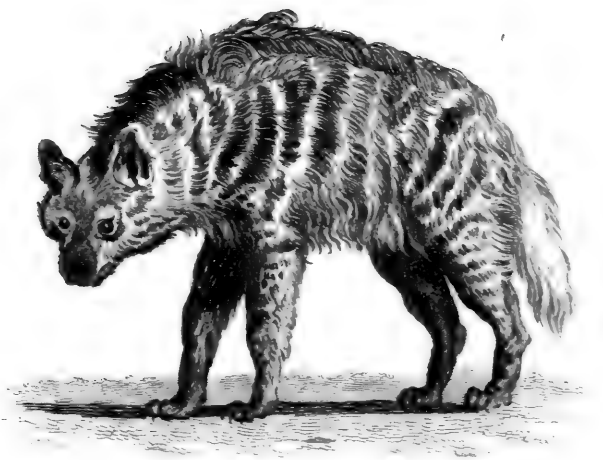
Its moſt ſtriking peculiarity remains to be mentioned, namely, its change of colour, being at one time brown, at another white; the blue never change colour, but ſome are, when brought forth, of a yellow hue, which, in the beginning of September, gradually changes to white; its fur is then two inches long; in May this begins to fall, and about the middle of July the iſatis again becomes brown.

THE HYÆNA

IS nearly the ſize of a wolf, and has ſome ſimilitude to that animal in ſhape. The head at firſt ſight agrees, except that its ears are longer and more bare of hair; obſerving cloſely, we find the head broader, the noſe flatter, and not ſo pointed; nor are the eyes placed obliquely; fore legs longer than the hinder; the feet different from all other quadrupeds, in having but four toes, as well before as behind. Its coarſe hair is a dirty greyiſh, marked with black, diſpoſed in waves down its body. Its tail is ſhort, with pretty long hair; immediately under it, above the anus, is an opening into a kind of glandular pouch (which ſeparates a ſubſtance of the conſiſtence, but not the odour, of civet), in which it is reſembled only by the badger. It holds its head ſomewhat like a dog purſuing the ſcent, with the noſe near the ground, by which the back appears elevated, which is augmented by a long briſtly band of hair that runs down it.

Savage and untameable, ever in a ſtate of rage or rapacity, ever growling, except when receiving food; then its eyes gliſten, the briſtles of its back ſtand upright, its head hangs low, and yet its teeth appear; a moſt frightful aſpect, heightened by a dreadful howl, which is very peculiar: its beginning reſembles the voice of a man moaning, its concluſion a violent effort to vomit, or a kind of groſs guttural laughing haw! haw! It ſeems the moſt untractable of quadrupeds; its courage equals its ferocity; it defends itſelf againſt the lion, is a match for the panther, attacks the ounce, and ſeldom fails to conquer.

Is a ſolitary animal; native of the moſt deſolate and uncultivated parts of the torrid zone; reſides in caverns of mountains, clefts of rocks, in dens formed by itſelf. Though taken young, cannot uſually be tamed;



The Hyæna.

it lives by depredation, ſometimes attacks man, carries off cattle, follows the flock, breaks open the ſheep-cots by night, and ravages with inſatiable voracity. Its eyes ſhine by night; and it is aſſerted, not without great appearance of truth, that it ſees better by night than by day. When deſtitute of other proviſion, it ſcrapes up the graves, and devours the dead bodies, how putrid ſoever.

Beſide the ſtriped hyæna, there is alſo a ſpotted hyæna, of congenial form and manners.

THE

CAT KIND.

THE Cat kind are diſtinguiſhed by their claws, which they can hide or extend at pleaſure. They ſeek their food alone: and, except at certain ſeaſons, are enemies to each other. They devour nothing but fleſh, and ſtarve on other proviſion; ever fierce, rapacious, ſubtle, and cruel; unfit for ſociety among each other, and unprofitable were they added to our liſt of domeſtics. Lions have been tamed ſo far as to become pageants of ſavage ſtate; and tigers have been ſubdued, but at too great trouble and riſque to encourage the practice.

Though differing in ſize or colour, they are nearly allied, and one is a ſpecimen of the whole. All the kind are inflexible in their forms, and wear the print of their natural wildneſs ſtrong upon them. The cat kind are alſo remarkable for their ſharpneſs and ſtrength of claws (whoſe gripe is extremely tenacious), their ſhortneſs of ſnout, their roundneſs of head, and their large whiſkers on the upper lip. Their teeth, in number thirty, are very formidable, but rather calculated for tearing their prey than for chewing. They feed but ſlowly, and while eating, growl, to deter others. Their hinder parts are much weaker than thoſe before, and ſeem leſs made for ſtrength than agility. Nor are they ſwift, but rather ſurpriſe their prey than hunt it. They ſeize it with a bound, expreſſing their fierce pleaſure with a roar; timid and cowardly, they ſeldom attack without advantage, but fly when the force oppoſing them is ſuperior or equal. The lion himſelf will not venture a ſecond attempt, where he has been once repulſed.

The Cat, the only one of the kind taken under human protection, is a faithleſs friend, oppoſed to a more inſidious enemy. The ſervices of the cat alone equal the trouble of raiſing it; and its ſtrength is not ſufficient to render its anger formidable. The lion or the tiger, if tamed, are dangerous by their ſtrength. The cat has only the appearance of attachment, as may eaſily be perceived by its timid approaches, and ſide-long looks.

The cat goes with young fifty-ſix days; brings five or ſix at a time. The female uſually hides her retreat from the male, who would devour her kittens. She ſuckles them ſome weeks, and accuſtoms them betimes to rapine. Lives about ten years; is extremely vivacious, and holds out long ere it dies. Kittens are playful and amuſing; but their ſport ſoon becomes malice. They early ſhew a diſpoſition to cruelty; often look wiſtfully towards the bird-cage, or ſit centinels at the mouth of a mouſe-hole, and ſhortly become expert hunters.

We are told of the Greek monks of the iſle of Cyprus, teaching cats to hunt the ſerpents with which the iſland is infeſted. Birds, rabbits, hares, rats, mice, bats, moles, toads, frogs, are equally purſued, though not, perhaps, equally acceptable. The mouſe ſeems to be the favourite. The cat has the ſenſe of ſmelling but meanly. Of all the marks by which the cat diſcovers its natural malignity, that of playing and ſporting with its little captive, before killing it outright, is the moſt flagrant.

In the eyes of cats, the contraction and dilatation of the pupil, is ſo conſiderable, that the orifice, which by day appears narrow, by night expands over the whole ſurface of the eye-ball, and their eyes ſeem on fire. By this conformation, they ſee beſt in darkneſs.

The cat is particularly fearful of water, of cold, and of ill ſmells; loves to keep in the ſun, to enjoy the fire, and to rub itſelf againſt thoſe who carry perfumes; is exceſſively fond of ſome plants (valerian, marum, and cat-mint); theſe it ſmells at a diſtance, rubs againſt them, and, if they be planted in a garden, wears them out. It loves fiſh, as well boiled as raw; it ſleeps very lightly; often ſeems to ſleep, the better to deceive its prey; treads very ſoftly, and without noiſe; is cleanly to the laſt degree. Its fur is uſually ſleek and gloſſy; eaſily electrified, ſending forth ſparks if rubbed in the dark.

The wild cat breeds with the tame; is larger than the houſe cat; its fur being longer, gives it a greater appearance than it really has; its head is bigger, and face flatter; the teeth and claws much more formidable;

dable; its muſcles very ſtrong, as being formed for rapine; the tail of a moderate length, very thick and flat, marked with alternate bars of black and white, the end always black; the hips, and hind part of the lower joints of the leg, always black; the fur very ſoft and fine: the general colour of theſe animals, in England, is a yellowiſh white, mixed with a deep grey. Theſe colours, though apparently blended, yet are diſpoſed like the ſtreaks of the tiger, pointing from the back downwards, riſing from a black liſt that runs from the head along the middle of the back to the tail. This animal is the moſt deſtructive of the carnivorous kinds in this kingdom; inhabits mountainous and woody parts, living moſtly in trees, and feeding by night. It ſhould ſeem that theſe are not original inhabitants of this kingdom, but from a domeſtic ſtate, became wild by ill uſage or neglect. By the laws of Howel, the Welch prince, the price of a kitten, before it could ſee, was a penny; then two-pence; when it commenced mouſer, four-pence: it was required, beſides, that it ſhould be of perfect hearing and ſight, be a good mouſer, have the claws whole, and be a good nurſe. If it failed in any of theſe qualities, the ſeller was to forfeit to the buyer the third part of its value. If any one ſtole or killed the cat that guarded the prince's granary, he was to forfeit a milch ewe, its fleece and lamb, or as much wheat as, when poured on the cat ſuſpended by the tail (the head touching the floor) would form an heap high enough to cover the tip of the tail.

In our climate we know but of one kind of wild cat: there are but few differences in this quadruped. Of all quadrupeds the wild cat has inteſtines ſmalleſt and ſhorteſt. Thoſe of the ſheep, for inſtance, unravelled and meaſured, will extend thirty times the length of its body; whereas the wild cat's inteſtines will not be found above three times the length of its body, and are, by one third, ſhorter than thoſe of the tame. If we ſay the domeſtic cat has inteſtines enlarged to the quantity of its food, this obſervation is contradicted in the wild boar and the wolf, whoſe inteſtines equal thoſe of the hog or the dog, though, like the wild cat, fed by precarious ſubſiſtence.

Wild cats were common alſo in Peru before its diſcovery, though not domeſtic. They abound in Africa, and many parts of Aſia. Some are of a peculiar colour, inclining to blue. Pietro della Valle informs us, there is a kind of cat, particularly in the province of Chorazan, in Perſia, of the form of the ordinary one, but infinitely more beautiful in the luſtre and colour of its ſkin, which is grey blue, as ſoft and ſhining as ſilk; tail very long, covered with hair ſix inches long, which the animal throws

throws upon its back like a ſquirrel. Theſe cats are well known in France; and have been brought into England, under the name of the *blue cat*, which ill expreſſes their colour.

Another variety is the cat of Angora; larger than the common cat; their hair is much longer, hangs about their head and neck; ſome white, others dun. There are other varieties in this animal, but rather in colour than form, as the tortoiſe-ſhell cat, and others.

THE LION.

THE Lion, produced under the burning ſun of Africa, is the moſt terrible, the moſt undaunted of animals; but thoſe bred in more temperate climates, or on the upper parts of lofty mountains, are far leſs dangerous, and have neither the ſtrength nor ferocity of the lions of Biledulgerid or Zaara, where the plains are covered with burning ſands. Happily the ſpecies is not very numerous, and ſeems to be diminiſhing as well in Lybia, as in Turkey, Perſia, and the Indies, occaſioned by the increaſe of mankind, the only animal in nature capable of effectually contending againſt theſe tyrants of the foreſt. The arms, even of an Hottentot or a Negro, render them more than a match for this powerful creature. This ſuperiority ſerves alſo to alarm and diſcourage him, for he is brave only in proportion to his former ſucceſs. The habit of conquering renders him intrepid and terrible. Thoſe which never experienced the power of man, have no apprehenſions. They boldly face him, and ſeem to brave the force of his arms. Wounds rather provoke their rage, than repreſs their ardour. A ſingle lion of the deſert will attack an entire caravan, and, after an obſtinate conteſt, when overpowered, inſtead of flying, he continues to combat, retreating, and facing the enemy till he dies. Whereas the lions which inhabit the peopled countries of Morocco or India, acquainted with human ſuperiority, have loſt their courage, are ſcared with a ſhout, and ſeldom attack any but flocks or herds, which women and children are ſufficient to protect.

When the lion is bred with domeſtic animals, he will play innocently and familiarly among them; and ſeldom exerts his natural ferocity againſt his benefactors. His anger is noble; his courage magnanimous; his diſpoſition grateful. He deſpiſes contemptible enemies, and neglects their inſults when he might puniſh them. He has been ſeen to ſpare the lives

lives of ſuch as were thrown to be devoured by him, to live peaceably with them, to afford them a part of his ſubſiſtence, and ſometimes to want food himſelf, rather than deprive them of that life his generoſity had ſpared. The lion is not cruel, ſince he never kills more than he conſumes. When ſatiated, he is gentle; while the tiger, the wolf, the fox, and others, kill without remorſe, are fierce without cauſe, and, by their indiſcriminate ſlaughter, ſeem rather to ſatisfy their malignity than their hunger.

His figure is ſtriking, his look confident and bold, his gait proud, his voice terrible. His ſtature is compact, well proportioned, and ſizeable; a perfect model of ſtrength, joined with agility; muſcular and bold, not charged with unneceſſary fat or fleſh. It is ſufficient to ſee him, to be aſſured of his ſuperior force. His large head, ſurrounded with a dreadful mane; his muſcles, ſwelling with the ſlighteſt exertions; the great breadth of his paws, and the thickneſs of his limbs, evince that no animal in the foreſt can oppoſe him. He has a very broad face that, as ſome have imagined, reſembles the human; ſurrounded with long hair, which gives it a very majeſtic air. The top of the head, the temples, the cheeks, the under jaw, the neck, the breaſt, the ſhoulder, the hinder part of the legs, and the belly, are furniſhed with it, while all the reſt of the body is covered with very ſhort hair, of a tawny colour. The hair about the neck and breaſt differs from the reſt only in length; nor is each hair pointed as in moſt other animals, but of equal thickneſs throughout. The neck has ſeven joints, which is univerſal to all quadrupeds. The tongue is rough, beſet with prickles as hard as a cat's claws; their grain turned backwards, ſo that ſhould a lion attempt to lick a man's hand, as we are told, it might tear off the ſkin. The eyes are always bright and fiery; nor even in death does this terrible look forſake them. The ſtructure of the paws, teeth, eyes, and tongue, are the ſame as in a cat; and the inward parts of theſe animals ſo nearly reſemble, that the anatomiſt's chief diſtinction ariſes merely from the ſize. The lion's mane grows longer as the animal grows older: the lioneſs is without this ornament. This mane is not coarſe or rough, but of the ſame hair with the body, lengthened and ſhining. The lion's colour is yellow or tawny throughout the ſpecies.

The lion has not the ſenſe of ſmelling equal to moſt other animals; and too ſtrong light greatly incommodes him. His eyes, like thoſe of the cat, ſeem fitted for ſeeing beſt in the dark; he therefore ſeldom appears in open day, but ravages chiefly by night. All animals of the cat

kind are kept off by fires, whereby the inhabitants preſerve their herds and flocks. The bright flame dazzles them, and they fear to venture blindly among their enemies. They hunt rather by ſight than ſmell.

The lion, when hungry, boldly attacks all animals; but as all avoid him, he is often obliged to hide, in order to ſurpriſe them. He crouches on his belly in ſome thicket, or among the long graſs of the foreſt, with patient expectation, till his prey comes within diſtance; then he ſprings fifteen or twenty feet, and often ſeizes it at the firſt bound. If he miſſes, and in two or three reiterated ſprings cannot ſeize his prey, he continues motionleſs for a time, ſeems very ſenſible of his diſappointment, and waits for a more ſucceſsful opportunity. In the deſerts and foreſts, his uſual prey are the gazelles and the monkeys, with which the torrid regions abound. The latter he takes when on the ground, for he cannot climb trees. He devours a great deal at a time, and generally fills himſelf for two or three days. His teeth are ſo ſtrong, that he eaſily breaks the bones and ſwallows them. It is reported that he ſuſtains hunger long, but not thirſt, his temperament being extremely hot; ſome have aſſerted that he is in a continual fever. He drinks water, lapping it like a cat. He generally requires about fifteen pounds of raw fleſh daily; prefers that of live animals; ſeldom eats what begins to putrefy, and chooſes rather to hunt for freſh ſpoil, than to return to what he had half devoured. His breath is very offenſive, and his urine inſupportable.

The roaring of the lion, when heard in the night, and re-echoed by the mountains, reſembles diſtant thunder. This roar is his natural note; when enraged he has a different growl, ſhort, broken, and reiterated. The roar is a deep hollow growl, which he ſends forth particularly before rain. His cry of anger is much louder, and more formidable. This is excited by oppoſition. When the lion ſummons up all his terrors, nothing can be more terrible. He laſhes his ſides with his long tail, which alone is able to knock down a man; his mane riſes ſtiffly round his head; his face is all agitation; his huge eye-brows half cover his glaring eye-balls; he ſhews his teeth, formed for deſtruction, his tongue covered with points, and his claws almoſt as long as a man's fingers. Thus prepared, few animals will venture an engagement; and the boldeſt of the human kind are daunted. The elephant, the rhinoceros, the tiger, and the hippopotamos, are the only animals that ſingly dare oppoſe him. The leopard and the wild boar, if provoked, will ſometimes abide his approach, and wait his onſet, which he ſeldom makes, unleſs compelled by hunger; they are ſometimes ſucceſsful. Theſe inſtances are rare;

rare; for the lion is in general undiſputed lord of the foreſt. Man only attacks him with ſucceſs, by the aſſiſtance of dogs and horſes trained to the purſuit. Theſe animals, that naturally would have fled from the lion in an agony, conſcious of human aid, purſue in turn, and boldly hunt their tyrant. The dogs are of the large breed; and the horſes, as Geſner aſſures us, of that ſort called *charoſſi*, or lion-eyed; all others flying the ſight of a lion, and endeavouring to throw their riders. The lion, when rouſed, recedes ſlowly, never goes off direct, but takes an oblique courſe, going from ſide to ſide, and bounding rather than running. He is very vivacious, never killed at once, but fights deſperately, even after he has received his mortal blow. He is alſo taken by pit-falls. The uſual manner of taking this animal is while a cub; the place near the den of the lioneſs is generally well known by the greatneſs of her depredations on that occaſion. The natives watch the abſence of the lioneſs, and, aided by a ſwift horſe, carry off her cubs, which they ſell to their great men or to ſtrangers.

The lion ſeldom quits the foreſt while able to ſubſiſt by his activity; but when old, and unfit for ſurpriſe, he boldly comes down into places more frequented; attacks the flocks and herds, notwithſtanding the habitation of their keeper, and depends on his courage for ſupport. If he finds men and quadrupeds in the ſame field, he only attacks the latter, unleſs the men provoke an engagement. He prefers the fleſh of camels and of young elephants, which he often attacks before their trunks are grown.

The lioneſs brings forth in ſpring; ſhe goes with young about five months; brings never more than two, about the ſize of a large pug dog, harmleſs, pretty, and playful; they continue the teat twelve months, and the animal is five years in coming to perfection.

The great lion, called Pompey, which died in the year 1760, was known to have been in the Tower above ſeventy years; and another, which was brought from the river Gambia, died aged about ſixty-three.

The lioneſs, though leſs ſtrong, leſs courageous, and leſs miſchievous than the lion, becomes terrible when ſhe has cubs. She then roams with fearleſs intrepidity; throws herſelf indiſcriminately among men and animals; deſtroys without diſtinction; and loads herſelf with ſpoil, and carries it reeking to her cubs, whom ſhe accuſtoms betimes to ſlaughter. She uſually brings forth in inacceſſible places; when ſhe fears a diſcovery of her retreat, often hides her tracks, by running back her ground, or by bruſhing them out with her tail; ſometimes alſo tranſports them to

another place, and, if obſtructed, defends them with determined courage to the laſt.

The lion can ſubſiſt in temperate climates; and formerly even the ſouth of Europe was infeſted by him. He is only found now in Africa and the Eaſt-Indies, where he grows to an enormous height. The lion of Biledulgerid is ſaid to be nearly five feet high, and between nine and ten feet from the tip of the noſe to the tail. The ordinary ſize is about four feet; the female being about one third leſs than the male.

The author of the Œconomy of Nature gives a wonderful relation of the inſtinct of lions. Amid the burning heat of Africa the pelican makes her neſt; and in order to cool her brood, and accuſtom them to an element with which they muſt afterwards be familiar, ſhe brings from afar, in her great gular pouch, ſufficient water to fill the neſt: the lion (and other wild beaſts) approach and quench their thirſt; yet never injure the unfledged birds, as if conſcious their deſtruction would ſtop thoſe grateful ſupplies.

THE TIGER.

THE ancients had a ſaying, *That as the peacock is the moſt beautiful among birds, ſo is the tiger among quadrupeds.* No quadruped can be handſomer. The gloſſy ſmoothneſs and brightneſs of his hair, the extreme blackneſs of its ſtreaks, the bright yellow ground they diverſify, are all eminently beautiful. To this is added an extremely elegant form, ſlender and delicate, expreſſing ſingular ſwiftneſs and agility. But this animal's diſpoſition is as miſchievous, as its form is admirable: fierce and ſavage beyond meaſure; neither can correction terrify, nor indulgence tame it. The careſſes of its keeper have no influence on its manners, and correction only increaſes its fierceneſs and malignity. The tiger ſnaps at the hand that feeds it; ſeems to conſider every object as its proper prey, which it devours with a look; and, though confined by bars and chains, makes fruitleſs efforts, as if to demonſtrate its ferocity, though it cannot exert its power.

The principal diſtinction of the tiger, is the ſhape of its ſtreaks, which run in the ſame direction as his ribs, from the back down to the belly, differing from the leopard, panther, and ounce, which are ſpotted. The tiger is often found bigger than the lion himſelf; is much ſlenderer alſo,

alſo, its legs ſhorter, and its neck and body longer. It reſembles almoſt exactly the cat in ſhape, eſpecially the male; and, if we conceive a he-cat ſufficiently magnified, he will afford a very apt idea of the tiger. Mr. Buffon was aſſured by one of his friends, that he ſaw a tiger, in the Eaſt-Indies, fifteen feet long, including the tail, for which allowing four feet, this animal muſt have been eleven feet from the tip of the noſe to the inſertion of the tail. Such is the royal tiger!

The tiger is fierce without provocation, and cruel without neceſſity; though glutted, is not ſatisfied with ſlaughter, but continues the carnage; its courage only inflamed by not meeting reſiſtance. Among a flock or herd, levels all, and ſcarce finds time to appeaſe its appetite, while intent on ſatisfying its malignity. The ſcourge of a country! it fears not mankind; beaſts wild and tame experience its inſatiable fury; often the young elephant and the rhinoceros, and ſometimes the lion himſelf.

The tiger is found in Malabar, in Siam, in Bengal, and other Aſiatic countries inhabited by the elephant or the rhinoceros. They frequent the ſides of lakes and rivers, compelled by the thirſt which in that torrid climate they often endure; and it is likely the tiger finds this a convenient ſituation to ſurpriſe many of thoſe animals which reſort thither from the ſame motives. It generally lurks where it has repeated opportunity of prey. When it has killed one, it often attacks others, ſwallowing their blood at large draughts, and ſeeming rather glutted than ſatiated with its abundance, it plunges its head up to the eyes in the body of its prey, and exhauſts the corpſe of blood, before it devours the fleſh.

Captain Hamilton informs us, that in the Sundah Raijha's dominions are three ſorts of tigers in the woods; the ſmalleſt is the fierceſt, not above two feet high, extremely cunning, and fond of human fleſh; the ſecond about three feet high, hunts deer and wild hogs; the largeſt ſort is above three feet and a half high, but not equally rapacious.

A peaſant in that country, ſays this traveller, had a buffalo fallen into a quagmire; while he went for aſſiſtance, there came a large tiger, that alone drew forth the animal. When the people returned, the firſt object they beheld was the tiger, which had thrown the buffalo over its ſhoulder, as a fox does a gooſe, and was carrying it away, feet upward, towards its den; it had killed the buffalo, and ſucked its blood. As ſome Eaſt-Indian buffaloes weigh a thouſand pounds, we may from hence

hence form a conception of the enormous ſtrength of this rapacious animal. As to its agility, we may gueſs at it, by obſerving the diſtance a cat can leap, which is ſeveral feet; and doubtleſs the tiger, being ten times as long, can ſpring proportionably. They are alſo fleet in running, but ſeldom exert this quality, preferring to take their prey by ſurpriſe, rather than chaſing.

This ſpecies is extremely ſcarce; of the number of its young we have no certain accounts; it is ſaid to bring four or five at a time; the female, ever furious, then exceeds her uſual rapacity. If her young be taken from her, ſhe purſues the ſpoiler with incredible rage; if ſhe overtake him, he drops one cub, with which ſhe immediately returns to her den, and again purſues him; he drops another, and by the time ſhe has returned with that, eſcapes with the remainder.

The tiger expreſſes its reſentment much like the lion; moves the muſcles and ſkin of its face, ſhews its teeth, and ſhrieks frightfully. Its note is very different from that of the lion, being rather a ſcream than a roar. The Indians ſometimes eat its fleſh, and find it neither diſagreeable nor unwholſome.

There is an American animal, uſually called the Red or Brown Tiger (by Mr. Buffon, the Cougar), which, though very different from the true tiger, yet reſembles it except in colour, being equally ſlender, and ſmaller necked, than others of the panther kind.

Theſe are common in South-America, and extremely deſtructive, carrying off fowls, dogs, and other domeſtic creatures. The Negroes and Indians are very dexterous in encountering them; and ſome, for a ſmall reward and their ſkins, ſeek their retreats. Their arms in this combat are a lance of two or three yards long, of heavy wood, the point hardened in the fire; and a kind of ſcymitar, about three quarters of a yard in length. They wait till the tiger aſſaults the left-hand, which holds the lance, and is wrapped in a ſhort cloak of baize. Sometimes the animal, aware of danger, declines the combat; but is provoked with a ſlight touch of the lance, which, when it feels, it graſps with one paw, and with the other ſtrikes at the arm which holds it. At this moment the perſon, with his other hand, nimbly aims a blow with his ſcymitar, and hamſtrings the creature, which immediately draws back enraged, but inſtantly returns to the charge, and by another ſtroke on the other paw, is deprived of the power of motion, and becomes an eaſy conqueſt.

Theſe animals are common in Guiana. They formerly ſwam over in great numbers to the iſland of Cayenne, to ravage the flocks and herds, and were a terrible ſcourge to the infant colony; but, by degrees, were repulſed. They are found in Brazil, in Paraguay, in the country of the Amazons, and in other parts of South-America. They often climb trees in queſt of prey; or to avoid their purſuers.

THE PANTHER.

THE Panther has been by many naturaliſts miſtaken for the tiger, which it approaches in ſize, fierceneſs, and beauty; but is diſtinguiſhed by being *ſpotted*, not ſtreaked. The panther is to Africa, what the tiger is to Aſia; with this alleviation, that it prefers the fleſh of brutes to that of man; but when hungry, makes no diſtinction. Its manner of taking its prey is equally inſidious as the tiger, by ſurpriſe, crouching in thickets, creeping on its belly till it can ſpring at once on its mark. Will climb up trees in purſuit of monkeys and leſſer animals. The Romans exhibited this creature and the leopard in their public ſhews: Pompey ſhewed four hundred and ten; Auguſtus, four hundred and twenty. But they ſtill ſwarm from Barbary to Guinea.

Next to the great panther, is the LEOPARD, which is often called the Leopard, or Panther of Senegal, where it is chiefly found. Their principal differences are as follow: The large panther is often ſix or ſeven feet long, from the tip of the noſe to the inſertion of the tail; the leopard of Senegal is not above four. The panther is marked with five or ſix ſpots, making a kind of circle, and a large one in the middle; except on the face and legs. The leopard is more beautiful, his yellow coat more brilliant, his ſpots ſmaller, not diſpoſed in rings, but in cluſters. They are both whitiſh under the belly; the tail of the firſt three feet, of the ſecond two and a half, conſequently rather longeſt in proportion.

The JAGUAR, or PANTHER of South-America, reſembles theſe two, except in the diſpoſition of its ſpots, and that its neck and head are rather ſtreaked than ſpotted; and the creature is ſaid to be lower on its legs. There is ſometimes ſeen a combat between this animal and the crocodile, which is extraordinary. When the jaguar comes to drink, the crocodile, who has been long watching to ſurpriſe any animal that

approached, raiſes its head above the water; the jaguar inſtantly ſtrikes its claws into the eyes of the crocodile (its only penetrable part), who, diving directly, pulls his enemy with him, and commonly both periſh.

Theſe three animals we may rank together, as they agree pretty nearly in their robe, their ſize, their diſpoſitions, and their ferocity.

The OUNCE is at moſt three feet and a half long; its tail often longer than the reſt of its body; its colour rather inclining to a cream colour, deeper on the back, whiter towards the belly. The hair on the back an inch and a half long; that on the belly, two inches and a half, which is much longer than that of the panther. Its ſpots are diſpoſed like thoſe of the panther; but on the haunches it has rather ſtripes than ſpots.

The ounce is remarkable for being tamed; and is employed in the Eaſt for the chace. A ſmall kind of panther is ſometimes uſed for this purpoſe; yet never thoroughly ſubdued, but uſually brought to the field in a carriage, and kept chained and caged till ſhewn their prey. This they purſue by three or four great ſprings. If it eſcape from their firſt effort, they appear quite confounded, and ſometimes are ſo much enraged at it, that they attack their employer, and his only reſource to avoid their fury, is to throw them ſome ſmall pieces of meat which he has brought with him for that purpoſe.

The ounce is treated with more confidence, and brought to the field hood-winked behind a horſeman. When the game appears, the ounce is inſtantly uncovered, and ſhewn where it lies; on which the fierce creature darts like an arrow, and ſeizes it at once, or, miſſing it, remains motionleſs in the place. It runs badly, and has no ſcent. Scent indeed is nearly, if not totally, uſeleſs in tropical climates; for their extreme heat produces ſuch univerſal putrefaction, ſuch various and powerful odours, that dogs themſelves are firſt bewildered, and at laſt deprived of the delicacy of their ſcent.

Among ſmaller animals of this kind is the CATAMOUNTAIN, or TIGER CAT of moſt who exhibit it. It is a Mexican animal, about two feet and a half in length, from the noſe to the inſertion of the tail. It is extremely like a cat, but larger and ſlenderer; its colours more beautiful, and its tail rather ſhorter. The fur is reddiſh, beautified with black ſpots, and ſtreaks, long on the back, and round on the belly and paws. On the ears are black ſtripes, which run acroſs; but, in other reſpects, they entirely reſemble thoſe of a cat. Theſe colours are not permanent, but differently diſpoſed in different ſpecimens.

The

The Catamountain, or Tiger Cat, one of the fierceſt, and, for its ſize, one of the moſt deſtructive animals in the world, is a native of South-America. Two of theſe, from which Mr. Buffon has taken his deſcription, were brought over from Carthagena, and having been taken from the dam very young, were ſuckled by a bitch. But, before they were three months old, they had ſtrength and ingratitude ſufficient to kill and devour their nurſe. Their ſucceeding fierceneſs and malignity ſeemed to correſpond with their firſt efforts; no arts could tame or ſoften them; they teſtified an unceaſing diſpoſition for ſlaughter: When food was given them, the male always ſerved himſelf before the female ventured to touch a bit, and not till after he was ſatisfied the other began. In their ſavage ſtate, they are highly deſtructive; having great ſtrength and agility, they eaſily overtake their prey, which they purſue among the tops of the trees, as well as on the ground. They ſuck the blood with avidity, and frequently leave the carcaſe untouched, to purſue other animals for their blood. They generally continue on trees, like our wild cats, where they often bring forth their young. When an animal paſſes beneath them, they dart down upon it with inevitable exactneſs.

From this tribe of the cat kind, with ſpotted ſkins and a long tail, we come to another with ſkins diverſified in like manner, but with a ſhorter tail. The principal of theſe is the LYNX.

The firſt ſtriking diſtinction of the lynx, from the panther kind, is its tail, which is barely half as long in proportion, and black at the extremity. Its fur is much longer, its ſpots leſs vivid, and confuſedly mingled; its ears long, tipped at the points with a black tuft of hair; colour round the eyes white, the phyſiognomy more placid. Each hair of this animal is of three different colours: the root a greyiſh brown, the middle red or aſh-coloured, the ends white. This whiteneſs makes the body appear as if ſilvered over; the hair in the ſpots has no white at the ends. This animal equals the ounce in ſize, but is ſtronger built, and it has but twenty-eight teeth; whereas all of the cat kind already mentioned have thirty.

The lynx inhabits chiefly the north of Germany, Lithuania, Muſcovy, Siberia, and North-America. Thoſe of the new continent are rather ſmaller than thoſe of Europe. It exactly reſembles the cat, except that, being nearly two feet long, it is bolder and fiercer. Like the cat, it climbs trees, ſeeks its prey by ſurpriſe, is delicate and cleanly, covering

its urine with its paws (but it reſembles the wolf in cry, which often deceives the hunters). Having once feaſted on its prey, will not return to it, but hunts for another: Whence may have ariſen the common report of the lynx having the ſhorteſt memory of all quadrupeds.

The SYAGUSH is native of the Eaſt-Indies, and reſembles the lynx in ſize, in form, and in being tufted at the tips of the ears; but differs in not being mottled. Its hair is rougher and ſhorter, its tail longer, its muzzle more lengthened, its phyſiognomy more fierce, and its nature more ſavage. Leaps on its prey, and creeping on their necks, ſcratches their eyes out.

The SERVAL is native of Malabar, reſembling the panther in its ſpots, but the lynx in the ſhortneſs of its tail, in its ſize, and in its ſtrong-built form.

Theſe ſeem to be the principal diſtinctions of this kind. From the large panther to the domeſtic cat, which is the ſmalleſt of all, their nature ſeems the ſame, fierce, ſubtle, cruel, and cowardly. The panther, the leopard, and the jaguar, as they are the largeſt, are alſo the moſt dangerous; but all are rapacious in proportion to their power.

The whole race may be conſidered as the inveterate enemy of mankind; others are ſtronger, but gentle; more numerous, but more feeble; and rather expect ſafety by concealment, than by oppoſition; while theſe maintain their ground, and may be ſaid to keep certain diſtricts of the earth in their own poſſeſſion.

THE

WEASEL KIND

ARE diſtinguiſhed by their length and ſlenderneſs of body, by which they paſs through very ſmall crevices. They bear the name of vermin from this ſimilitude to the worm. Their claws can neither be drawn in nor extended at pleaſure (as cats). They are clothed rather with fur than hair; and have glands near the anus, opening into, or beneath it, furniſhing a ſubſtance, in ſome the moſt offenſive ſmell in nature, in others a pleaſing perfume; cruel, voracious, cowardly, thieviſh, and ſlow; ſupported by their patience, aſſiduity, and cunning; live long without food; but if they meet with plenty, deſtroy all before they ſatisfy their appetite, and ſuck the blood, before they touch the fleſh.

The

The WEASEL is in length barely ſeven inches, from the noſe to the inſertion of the tail; its height not above an inch and a half, conſequently is near five times as long as high. The buſhy tail, of two inches and a half, adds to the animal's apparent length. Colour pale tawny brown on the back and ſides, white under the throat and belly; has whiſkers like a cat, and thirty-two teeth (two more than the cat), and theſe better adapted for tearing and chewing than the cat's. Eyes little and black; ears ſhort, broad, and rounded, have a fold at the lower part, which makes them ſeem double. Beneath the corners of the mouth, on each jaw, a brown ſpot.

This animal inhabits the temperate parts of Europe, ſcarce in the North and in Barbary; is very formidable to quadrupeds an hundred times its ſize. Where ſheep or lambs are bred, the weaſel is deteſted and deſtroyed as noxious; where agriculture is followed, is conſidered as a friend, being deſtructive to ſuch vermin as live on corn. One of the moſt untameable and untractable of animals. When kept in a cage, will not touch its victuals while looked at; is continually agitated; and frighted ſo much at the ſight of mankind, that it will die, if not permitted to hide itſelf in a ſufficient quantity of wool or hay, whereto it may carry its food; paſſes three parts of the day in ſleep; night its time of exerciſe and feeding. Is ſeen ſtealing from its hole at the approach of evening, and creeping about the farmer's yard for prey. If it enters among poultry, immediately aims at the young ones; does not eat its prey on the place, but killing it by a ſingle bite near the head, with a wound ſcarcely perceivable, carries it off; is a great devourer of eggs; is remarkably active; in a confined place, ſcarce any animal can eſcape it; runs up the ſides of walls with facility, and winds through a very ſmall hole. In winter, chiefly confines itſelf in barns and farm-yards, till ſpring, where it brings forth, and makes war on rats and mice, with greater ſucceſs than the cat, purſuing them into their holes. A gentleman once found eighty-five, newly killed, in one weaſel's hole. Creeps alſo into pigeon holes, deſtroys the young, catches ſparrows, and ſmall birds; and, if it has young, hunts with great boldneſs and avidity. In ſummer, ventures farther from the houſe, to where the rat, its chief prey, precedes it; is found in low grounds, by the water-ſide, near mills, and often hides its young in the hollow of a tree.

The female takes every precaution to make an eaſy bed; lines her hole with graſs, hay, leaves, and moſs; brings from three to five, with cloſed eyes; but ſoon ſtrong enough to follow their dam, and aſſiſt in

her rapine. The weaſel does not run, but bounds; when it climbs a tree, gets high from the ground by a ſingle ſpring; jumps on its prey; and, having an extremely limber body, evades the attempts of much ſtronger animals to ſeize it.

This animal has a very ſtrong peculiarly fœtid ſmell; the glands which furniſh this fœtid ſubſtance (which is of the conſiſtence of ſuet) open directly into the anus, and taint the excrement, more ſtrongly in ſummer than in winter; and when irritated or purſued, than when at eaſe. Always preys in ſilence; when ſtruck, by a rough kind of ſqueaking, at once expreſſes reſentment and pain; never loſes its appetite for animal food, and ſeems to enjoy the vicinity of putrefaction. Mr. Buffon tells us of one found, with three young ones, in the carcaſs of a wolf that was putrid, and had been hung up, by the hind legs, as a terror to others.

THE

ERMINE, OR STOAT.

THE Stoat, or Ermine, uſually exceeds nine inches long; the tail five inches and a half, tipped with black; edges of the ears and ends of the toes yellowiſh white; general colour lightiſh tawny brown; in winter, becomes white or cream-coloured; yet always retains the black tip of the tail. Sometimes found white in Great Britain. Haunts woods, hedges, and meadows, by brook ſides; rarely barns, &c.

The ermine is remarkable for the ſoftneſs, cloſeneſs, and warmth of its fur. Mr. Daubenton had one with its winter fur, which he kept to obſerve its manner of moulting. He received it in the beginning of March; very ſhortly it began to ſhed its coat, and a mixture of brown variegated the white; at the ninth of the month its head was nearly a reddiſh brown; this colour daily extended along the neck and back, like a ſtripe of half an inch broad. The fore-part of the legs then aſſumed the ſame colour; part of the head, the thighs, and the tail were the lateſt, but all changed by the end of the month. This little animal, when confined, was very wild and untractable, ever violently agitated except when aſleep, which often occupied three parts of the day. Except for its diſagreeable ſcent, was an extremely pretty creature, its eyes

eyes ſprightly, its phyſiognomy pleaſant, motions ſwift. It ate eggs or fleſh, but always let them firſt putrify. As ſome of this kind are fond of honey, it was tried with ſuch food, of which it ate, and died ſhortly after.

In the north of Europe and Siberia, their ſkins make a valuable article of commerce; are there abundant; ſome in Newfoundland and Canada; burrow in the fields, or in birch foreſts, never in thoſe of fir or pine; are ſhot with blunt arrows, or taken in traps made of two flat ſtones; one propped with a ſtick, to which is faſtened a baited ſtring; when the animals attempt to pull this away, the ſtone drops, and cruſhes them.

THE FERRET

IS above one foot long, of ſlender body and ſhort legs; its noſe ſharp; is commonly of a cream colour, but are found white, blackiſh, brown, and party-coloured. The whitiſh have red eyes, as is almoſt general with animals entirely of that colour. The hair on its tail is much longer than in the weaſel; tail five inches.

This animal is native of the torrid zone, from whence it was fetched into Spain to free that country from rabbits, which over-run it; cannot bear our climate, without care and ſhelter; kept for its uſe in the warren; is naturally ſuch an enemy of the rabbit, that if a dead rabbit be be preſented to a young ferret, though it has never ſeen one before, it inſtantly attacks it. If the rabbit be living, the ferret eagerly ſeizes it by the neck, winds itſelf round it, and ſucks its blood. In warrens they enter the holes, and drive the rabbits into nets at the mouth. The ferret is always muzzled, leſt it ſhould continue at the bottom of the hole. If it diſengages itſelf of its muzzle, inſtead of returning, it leads a rapacious ſolitary life during ſummer, and dies with the cold of winter; unleſs ſmoked from his hole.

The female is leſs than the male; they ſleep almoſt continually; the inſtant they wake, ſeem eager for food, which is uſually bread and milk; they breed twice a year, bring five, ſix, to nine at a litter. Some of them devour their young. The ferret is uſeful, but diſagreeable and offenſive; fœtid, voracious, tame without attachment; blood-thirſty,

even to the killing children in the cradle; eaſily irritated, then eſpecially its ſmell offenſive; its bite very difficult of cure.

To the ferret kind, we may refer an animal which Mr. Buffon calls the VANSIRE, the ſkin of which was ſent him ſtuffed from Madagaſcar; thirteen inches long; much reſembling the ferret, but having twelve grinding teeth, whereas the ferret has but eight. In colour, a dark-brown throughout.

THE POLECAT

IS one foot five inches long; ſo much reſembles the ferret, that ſome have thought them the ſame; but is larger, not ſo ſlender, has a blunter noſe; differs internally, having but fourteen ribs, whereas the ferret has fifteen; wants one breaſt bone of the ferret. Warreners aſſert, that they will mix, and this is promoted to improve the breed of ferrets, which, by long confinement, ſometimes abates its rapacious diſpoſition. The produce moſt reſembles the polecat, being darker than the ferret.

The polecat is principally a deep chocolate colour; white about the mouth; ears ſhort, rounded, and tipt with white; a little beyond the mouth a ſtripe begins, which runs backward, partly white, partly yellow: its hair (like that of all this claſs) is of two ſorts; the long, and the furry; of different colours; the longeſt black, the ſhorter yellowiſh; the throat, feet, and tail are blackeſt; the claws white underneath, brown above; tail about ſix inches. Is very deſtructive to young game of all kinds; but the rabbit ſeems its favourite prey; a ſingle polecat will often deſtroy a warren; it kills much more than it can devour. Reſides in woods or thick brakes, making holes under ground of two yards deep, ending among roots of large trees for ſecurity. In winter, frequents houſes, robs the hen-rooſt and the dairy; is particularly deſtructive among pigeons; diſpatches each with a ſingle wound in the head: after killing many, and ſatiating itſelf with their blood, carries them one by one to its hole; but if the opening by which it entered the dove-houſe be too ſmall for the body of the pigeon to paſs, contents itſelf with carrying away the heads, and feaſts on the brains. Is fond of honey, attacks the hives in winter, and forces the bees away.

The

The female brings forth in ſummer, five or ſix at a time; theſe ſhe ſoon trains to rapacity, ſupplying the want of milk (of which no carnivorous quadruped has plenty) by the blood of animals. The fur is ſoft and warm; but its offenſive ſmell can never be removed or ſuppreſſed. The polecat inhabits temperate climates; is rare in the north and in warm latitudes.

THE MARTIN

IS generally eighteen inches long; the tail ten, and buſhy at the end; its cry ſharp and piercing; its noſe flatter than the polecat; its colours more elegant; its ſcent not offenſive, but conſidered as a perfume; the moſt beautiful of all Britiſh beaſts of prey; its head ſmall and elegant; eyes, lively; ears, broad, rounded and open; back, ſides, and tail, covered with a fine thick downy fur, with longer hair intermixed; the roots aſh colour, the middle bright cheſnut, the points black; the head is brown, with a ſlight caſt of red; the legs, and upper ſides of the feet, chocolate colour; the palms, or under ſides, covered with a thick downy fur; the feet broad; claws white, large and ſharp, well adapted for the purpoſes of climbing, but incapable of being ſheathed or unſheathed; throat and breaſt, white; belly of the ſame colour with the back, but rather paler; hair on the tail very long, eſpecially at the end, where it appears much thicker than near the inſertion.

There is a yellow-breaſted martin; differs only by its yellow breaſt; the colour of the body is darker, and its fur more valuable, beautiful and gloſſy; is much more common in France than in England; yet even there is much ſcarcer than that with the white breaſt.

Of all the weaſel kind, the martin is the moſt pleaſing; its motions are graceful and agile; ſcarce an animal in our woods will oppoſe it: the wild cat itſelf, though much ſtronger, is not its match, and ſeldom meets it without a combat; has been kept partly tamed, in which ſtate it ate every thing except ſallad or herbs; was remarkably fond of honey; drank often; often ſlept two days together, and often paſſed two or three days without ſleep. Before it ſlept, drew itſelf into a round, and hid its head by its tail.

When the martin finds itſelf purſued by dogs (for which there is a peculiar breed) it makes to its retreat, which is generally the hollow of

ſome tree, toward the top, which to come at, it muſt be cut down. Their neſt is generally the original tenement of the ſquirrel. It brings three or four, to ſix; their eyes cloſed. The dam compenſates her deficiency of milk, by bringing them eggs (which ſhe often carries whole) and live birds, accuſtoming them early to rapine. When ſhe leads them into the woods, the birds diſcover and attend them, threatening and inſulting her, alarming every thicket, and often directing the hunter.

The martin is more common in North-America than in Europe; but is found in all the northern parts, from Siberia to China and Canada. They are hunted for their furs, which are very valuable.

THE SABLE.

SABLE fur is held in the higheſt eſteem; is browniſh black; the darkeſt moſt valuable. A ſingle ſkin, not above four inches broad, is often valued at 10 or 15*l.* The fur has no grain; every way equally ſmooth and unreſiſting.

The ſable reſembles in form the martin, and the weaſel in the number of its teeth; is eighteen inches long, tail twelve; very large whiſkers about the mouth; its feet broad, five claws on each foot. Some are dark brown over the body, except the ears and throat, where the hair is rather yellow; others yellowiſh, their ears and throat paler. Theſe are their winter colours, which they change in ſpring; the former becoming a yellow brown, the latter a pale yellow; ſometimes found ſnow-white. They reſemble their kind in vivacity, agility, and inquietude; in ſleeping by day and preying by night, and in their diſagreeable odour. Live on ſmaller animals, ermines, weaſels and ſquirrels, but eſpecially hares; in autumn on berries; bring forth in April from three to five.

Inhabit the banks of rivers, in ſhady places, and the thickeſt woods, beneath the roots of trees, or holes in the earth; leap eaſily from tree to tree, and are ſaid to fear the ſun; are moſtly found in Siberia, very few elſewhere; but ſuppoſed, in one of its varieties, to be found in America, where it grows large. Sable hunting is chiefly followed by condemned exiles ſent from Ruſſia into theſe wild and extenſive foreſts, that, great part of the year, are covered with ſnow. They are obliged to ſhoot with only a ſingle ball, or with croſs-bow and blunt arrows, to avoid ſpoiling the ſkin.

THE ICHNEUMON.

THE ichneumon, which ſome have injudiciouſly denominated the Cat of Pharaoh, is the boldeſt and moſt uſeful of the weaſel kind; in Egypt is uſed as the cat in Europe, and is more expert in catching mice. Differs in ſize from twenty-four to forty-two inches; reſembles the martin in appearance, but the hair is of a griſly black, much rougher and leſs downy; the tail is not ſo buſhy at the end, and each hair has three or four colours, which ſhew in different diſpoſitions of its body. Under its rougher hairs is a ſoft browniſh fur; the rough hair is about two inches long, on the muzzle extremely ſhort, as on the legs and paws. Being long ſince domeſticated, has many varieties.

The ichneumon, to the ſtrength of a cat, unites more inſtinct and agility, more univerſal appetite for carnage, and greater variety of powers to procure it; purſues equally rats, mice, birds, ſerpents, lizards, inſects, every living thing which it can overcome. Its courage equals its appetite. It fears neither dog, cat, vulture, nor viper; attacks all kinds of ſerpents with avidity, ſeizes and kills them how venomous ſoever, even the *cobra di capello*, ſkilfully ſeizing them by the throat to avoid injury. It diſcovers and deſtroys the eggs of crocodiles, and kills the young ones ere they reach the water; generally reſides on the banks of rivers, in times of inundation approaching inhabited places, in queſt of prey. Advances ſilently and cautiouſly, changing its manner according to circumſtances: ſometimes carries its head high, ſhortens its body, and raiſes itſelf on its legs; ſometimes lengthens itſelf, and creeps along the ground, or ſits on its hind legs, like a dog when begging; or will feign itſelf dead; loves fiſh; darts like an arrow on its prey, and ſeizes it with inevitable certainty. Its eyes are ſprightly and full of fire; its phyſiognomy ſenſible, its body nimble, tail long, hair rough and various. Like all of its kind, has glands that open behind, and furniſh an odorous ſubſtance. Its noſe is too ſharp, and its mouth too ſmall, to ſeize large things; eaſily ſtrangles a cat, and fights with dogs; takes the water like an otter, and is ſaid to continue under it much longer; grows faſt and dies ſoon.

Is found plentifully in the ſouth of Aſia, from Egypt to Java; in Africa, at the Cape of Good Hope; is incapable to ſupport the rigour of our winters.

This

This animal was formerly worſhipped by the Egyptians. If we conſider the number of eggs which the crocodile lays, often three or four hundred, we have reaſon to admire this animal's uſefulneſs, as well as induſtry, in deſtroying them, ſince otherwiſe the crocodile might be produced in ſufficient numbers to over-run the whole earth; beſide which, his ſervices in deſtroying the various kinds of ſerpents, place his utility much above that of many deities adopted among that ſuperſtitious people.

THE STINKARDS.

ALL the weaſel kind have glands furniſhing an odorous matter, near the anus. The ſubſtance they furniſh is in ſome a perfume; in others, as the weaſel, ermine, ferret, and polecat, is extremely offenſive; but the ſmell of theſe is fragrance itſelf, when compared to that of the *Squaſh* and the *Skunk*, which are found in America, alſo in the ſouth of Africa, and denominated by our ſailors THE STINKARDS. The glands in theſe animals are much larger, and furniſh a matter ſublimed to a degree of putreſcence truly amazing. A ſingle grain of muſk or civet will diffuſe itſelf over a houſe, and continue for months; but this is nothing, either for ſtrength or duration, to this inſupportable odour. It is uſually voided with their excrement; and if but a ſingle drop happens to touch a man's garment, it is ſcarce poſſible he ſhould wear any part of it more. This ejection of their excrement defends them againſt their purſuers; nor is employed, except when enraged or affrighted. They are often kept tame about houſes in America, without being very offenſive.

The *Squaſh* is about the ſize of a polecat, its hair a deep brown, but differs in having only four toes on the feet before, whereas all other weaſels have five. The *Skunk* reſembles a polecat, but differs in the length of its hair and colour. The hair is above three inches and a half long, at the end of the tail above four inches. Colour is partly black, partly white, variouſly diſpoſed, very gloſſy, long and beautiful.

The Conepate and the Zorille ſeem varieties. The conepate reſembles the ſkunk, except in ſize, being ſmaller, and in the diſpoſition of its colours, which are more exact, having five white ſtripes on a black ground, running longitudinally from the head to the tail. The zorille reſembles

reſembles the ſkunk, but is rather ſmaller and more beautiful; its ſtreaks of black and white more diſtinct; and its tail black at its inſertion, and white at the extremity; whereas in the ſkunk they are all grey.

The SQUASH burrows in the clefts of rocks, where it brings forth; ſteals into farm-yards, and kills the poultry, eating only their brains. If purſued, calls up all its ſcents, which reach half a mile round, and near are ſtifling. If purſued, endeavours to eſcape by getting up a tree, or by ſome ſuch means; driven to extremity, lets fly on the hunters; ſhould a drop of this fœtid diſcharge fall in the eye, the perſon runs the riſque of being blinded for ever. The dogs inſtantly abate of their ardour, turn tail, and leave the animal, rubbing their noſes in the graſs. In 1749, ſays Kalm, one came near the farm where I lived, in winter time, during the night; the dogs on the watch purſued it, until it diſcharged againſt them: though I was in bed a good way off, I thought I ſhould have been ſuffocated; and the cows and oxen, by their lowings, ſhewed their ſufferings by the ſtench. Another crept into our cellar, but did not exhale the ſmalleſt ſcent; till a fooliſh woman, who perceived it at night, by the ſhining of its eyes, killed it. That moment its ſtench began; the cellar was filled with it to ſuch a degree, that the woman kept her bed ſeveral days, and all the proviſions were ſo infected, that they were obliged to be thrown out of doors.

THE GENETTE

IS rather leſs than the martin; reſembles the weaſel kind, in its length, compared to its height, in having a ſoft beautiful fur, its feet armed with claws that cannot be ſheathed, and its appetite for petty carnage. It differs in having the noſe much ſmaller and longer, the tail alſo tapers to a point, and is much longer; its ears are larger, and its paws ſmaller; is ſpotted with black, on a ground mixed with red and grey; has two ſorts of hair, one ſhorter and ſofter, the other longer and ſtronger, half an inch long; longer on the tail; its ſpots diſtinct and ſeparate on the ſides, unite towards the back, forming black ſtripes, which run longitudinally from the neck backwards; has along the back a kind of mane or longiſh hair, which forms a black ſtreak from head to tail; tail marked with rings, alternately black and white, its whole length. Like all the weaſel kinds, has glands; theſe ſeparate a kind of perfume; open differently

from thoſe of other animals of this kind, under the anus, ſo that the male ſeems, on ſuperficial obſervation, to be of two ſexes.

Belon aſſures us, that he has ſeen them in the houſes at Conſtantinople as tame as cats, and employed in ſimilar purpoſes. The ſpecies is not much diffuſed; is found in Spain and Turkey, and part of France; requires a warm climate; yet is not found in India or Africa.

THE CIVET.

THE civet is found above thirty inches long. Mr. Buffon diſtinguiſhes this ſpecies into two kinds, the civet and the zibet. The latter differs in being longer, ſlenderer, the noſe ſmaller, the ears longer and broader; no mane or long hair running down the back; the tail longer and better marked with rings of different colours.

The civet reſembles the weaſel kind in ſlenderneſs of body, ſhortneſs of legs, the odorous matter from the glands behind, the ſoftneſs of its fur, the number of its claws, and their incapacity of being ſheathed. It differs in being larger, the noſe lengthened, the tail long and tapering to a point, and its ears ſtrait like thoſe of a cat. Is commonly aſh-coloured, ſpotted with black (the female is whiter, tending to yellow); and the ſpots are much larger, like thoſe of a panther; on the belly, and under the throat, is black; the body black or ſtreaked with grey; is ſometimes ſtreaked, as tabby cats; has whiſkers; its eye is black and beautiful.

The bag, which is the receptacle of the civet, opens under the anus. There is another opening lower down, but of what uſe is not known. The bag is about two inches and a half broad, and two long, covered with ſhort hair, large enough to hold a ſmall pullet's egg. In this are ſmall glands, furniſhing a ſtrong perfume, of the colour and conſiſtence of pomatum.

Is bred among the Turks, Indians, and Africans; alſo in Holland, where they make no ſmall gain of its perfume, being reckoned the pureſt. It gives in proportion as it is delicately and abundantly fed. Eats raw fleſh haſhed ſmall, eggs, rice, birds, young fowls, and particularly fiſh. Drinks but rarely, yet urines frequently. The perfume of the civet communicates itſelf to all parts of the animal; the fur and the ſkin preſerve the odour long. If a perſon be ſhut up with one of them in a cloſe room, he cannot ſupport the perfume. When irritated, its

ſcent is violent; if it be made to ſweat, this alſo is a ſtrong perfume, and ſerves to adulterate or increaſe what is otherwiſe obtained from it.

The civet is ſaid to be wild and fierce; though ſometimes tamed, never familiar. Its teeth ſtrong and cutting; its claws feeble. Light and active; it purſues birds and ſmall animals. Their eyes ſhine in the night; probably they ſee beſt in the dark. They breed very faſt in their native climates.

THE GLUTTON,

WHICH Linnæus places among the weaſels, from the ſimilitude of its teeth; to this agrees its length of body, its ſhortneſs of legs, the ſoftneſs of its fur, its diſagreeable ſcent, and its inſatiable appetite for animal food. Mr. Pennant, however, ranks it among the bears.

Is about twenty-eight inches from noſe to tail; the fore legs about one foot from the extremity of the nails to the body; the hind legs ſomewhat longer; the tail eight inches, including four inches of hair at the end; the muzzle black to the eye-brows; from the eye-brows to the ears, white mingled with brown; ears one inch long; front of its body ſpotted with white; the legs, tail, belly, and back, black; ſides of a yellowiſh brown; interior fur or down, white; five very crooked claws, better fitted for climbing trees than for running along the ground; is found in the north of Europe and Siberia, and in North-America, where it is named the Carcajou.

In America, this voracious creature lurks among the thick branches of trees to ſurpriſe the deer. Endued with patience equal to its rapacity, ſingles out trees marked by the teeth or the antlers of deer, and there remains watching. When the elk or the rein-deer paſs, it darts down upon them, ſticks its claws between their ſhoulders, and there remains. In vain the frighted animal increaſes its ſpeed, or threatens with its horns; drives rapidly among the thickeſt woods, and ſtrikes againſt the largeſt trees. It never ſeizes without bringing down its prey, unleſs it plunges into water, which the glutton fears. The deer, feeble with loſs of blood, falls, and the glutton compenſates former abſtinence, by preſent voracity. It is indeed amazing how much one of theſe animals can eat at a time! That ſeen by Mr. Klein, though in captivity, ate thirteen pounds of fleſh daily, yet remained unſatisfied.

Mr. Buffon ſays, one he had, ate four pounds daily, but ſwallowed it ſo faſt as to riſque choaking. After a long faſt it gorges till incapable of motion; it lies torpid two or three days by the animal it has killed, protected even from the wolf and bear by its horrid ſmell. Thus eating and ſleeping till its prey be devoured, bones and all, then returning to its poſt of expectation. Seems to prefer putrid fleſh; is ſo ſlow, that moſt quadrupeds eſcape it, except the beaver, which it frequently purſues on land; but the beaver generally makes good its retreat by taking to the water; often examines the traps laid for other animals; ſteals on the retreats of the rein-deer, whoſe fleſh it prefers; ſeeks animals wounded by the hunters; purſues the iſatis while hunting for itſelf; when that animal has run down its prey, comes in and ſeizes the whole; ſometimes devours its provider; digs up graves, and devours the bodies.

Is a ſolitary animal, never ſeen in company except with its female in the midſt of winter; goes with young about four months, and brings two or three; burrows in holes. Male and female are generally found together, and equally reſolute in defence of their young. Linnæus informs us, that it is very difficult to be ſkinned.

OF THE

HARE KIND.

ANIMALS of the hare kind, like all that feed on vegetables, are inoffenſive and timorous. Abundantly ſupplied by nature, they have not that ravenous appetite remarkable in ſuch as are often ſtinted in proviſion.

The hare, the rabbit, and the ſquirrel, are placed by Pyer among thoſe that chew the cud; nevertheleſs they chew their meat very much before they ſwallow it. They uſe their fore-paws like hands; are ſo very prolific, that were they never moleſted, they would quickly overrun the earth.

The HARE is the largeſt, the moſt perſecuted, the moſt timorous; its muſcles and its ſenſes ſeem given only for flight; by its large prominent eyes, placed backward in the head, it can almoſt ſee behind it as it runs. Theſe are never wholly cloſed; but the watchful animal ſleeps with them open.

open. The ears are remarkably large, are moveable to every quarter, and readily receive the ſmalleſt ſounds; the hinder feet are longer than the fore, which augments its rapidity, eſpecially up hill.

The hare multiplies exceedingly; the females go with young thirty days; generally bring three or four. They are alſo fitted in an extraordinary manner for multiplying their kind; the conformation of the womb permits pregnancies of different conceptions, after one delivery retaining another: being divided, ſo that one ſide may be filled, while the other remains empty.

The young are brought forth with their eyes open; the dam ſuckles them twenty days, after which they leave her, but ſeldom ſeparate far from their native place, but make each a form at ſome diſtance, having a predilection rather for the place than each other's ſociety. They repoſe by day, feed during night, chooſe the tender graſs, quenching their thirſt with dew; eat alſo roots, leaves, fruits, and corn; prefer ſuch plants as have milky juice; ſtrip the bark of trees during winter, except the lime or the alder; are fond of birch, pinks, and parſley. In February, the male purſues the female by the ſagacity of his noſe. They are then ſeen, by moon-light, playing, ſkipping, and purſuing each other; but the leaſt alarm diſturbs their revels; they inſtantly fly, each a ſeparate way.

In running, they eaſily outſtrip all other animals at firſt; could they preſerve their ſpeed, it would be impoſſible to overtake them; but their firſt efforts exhauſt their ſtrength, and they double back to the place they were ſtarted from. Their motions are ſilent, the ſole of their foot being furniſhed with hair; and they ſeem ſingular in having hair within their mouths; live ſeven or eight years; come to perfection in a year. It is ſaid the females live longer than the males; are ſeldom heard to cry, except when ſeized or wounded; their voice is not ſharp; are of a complying nature, and ſuſceptible of a kind of education; eaſily tamed, but incapable of attachment. If taken never ſo young, regain their native freedom the firſt opportunity. They have a remarkable good ear, can ſit on their hind legs, uſe their fore-paws as hands, and have been taught to beat the drum, to dance to muſic, and perform the manual exerciſe.

They make their form in places where the colour of the graſs moſt reſembles them; open to the ſouth in winter, to the north in ſummer. The hare, when it hears the hounds at a diſtance, flies by impulſe: Having attained ſome hill, and left the dogs far behind, it ſtops, rears

on

on its hinder legs, and looks back. Sometimes will ſtart a freſh hare, and ſquat in the ſame form; ſometimes will creep under the door of a ſheep-cot, and hide among the ſheep; will enter holes; will go up one ſide of the hedge, and come down the other; run a good way thereon; take to furze buſhes, leap from one to another, by which the dogs are frequently miſled. Young hares tread heavier, and leave a ſtronger ſcent, than the old. The more this creature tires, the heavier it treads, and leaves the ſtronger ſcent. In moiſt weather, they hold by the high-ways moſt, becauſe the ſcent is then ſtrongeſt on the graſs.

When the male and female keep one ſpot, they ſuffer no ſtrange hare to make its form in the ſame quarter. They live in woods and thickets, but are naturally fonder of the open country. Hunted, ſhot, ſnared by men; deſtroyed by dogs, birds, cats, ants, ſnakes, and adders; perſecuted by fleas; it ſeldom reaches even that ſhort term to which it is limited by nature.

Around the north-pole, they become white in winter, and run in troops of four or five hundred on the banks of the Irtiſh, or the Jeniſca, as white as ſnow. Their fur forms a conſiderable article in the hat manufacture. A few are entirely black.

The hares of hot countries are ſmaller than ours. This animal is found from the torrid zone to the polar circle. The Jews, the ancient Britons, and the Mahometans, all rejected it as unclean, and religiouſly abſtained from its fleſh; moſt other people, at preſent, conſider it as agreeable. The ancient Romans ſo much admired it, as to call it the food of the wiſe.

THE RABBIT.

THE rabbit, though nearly reſembling the hare in form and manners, is diſtinct in kind. In fecundity the rabbit exceeds the hare; breeds ſeven times in a year; brings eight young. Should this happen regularly during four years, the progeny would exceed a million. The rabbit makes a hole, where it continues great part of the day, and breeds in ſecurity; but it loves the ſunny field and open paſture; ſeems to be a chilly animal; is continually out when without fear; often brings forth at a diſtance from the warren, in a hole a foot deep; ſuckles about a month, covering its young with moſs and graſs.

In the warren, always brings forth in a hole ſeparate from the male, more intricate and more ample than ordinary; ſhe pulls off her belly a good quantity of hair, with which ſhe makes a bed. The two firſt days ſhe does not ſtir out but for nouriſhment; ſuckles her young near five weeks; the male ſeldom viſits them, but when grown up, he ſeems to acknowledge them as his offſpring, takes them between his paws, ſmooths their ſkin, and licks their eyes, beſtowing on each alternately an equal ſhare of careſſes.

When a freſh warren is ſtocked with tame rabbits, unaccuſtomed to the art of ſcraping a hole, they continue expoſed to the weather and accidents without burrowing; and not till after two or three generations begin to find the neceſſity and convenience of an aſylum.

Rabbits are of various colours; white, brown, black, and mouſe-colour. The black are the ſcarceſt. Moſt wild rabbits are brown; in every neſt of rabbits, whether the parents be black or white, are ſome brown.

A gentleman who bred rabbits for amuſement, ſays, "the deſcendants were ſurpriſingly obedient and ſubmiſſive to their common parent, who was eaſily diſtinguiſhed by his ſuperior whiteneſs; when they quarrelled among each other, he ran directly up, and all was inſtantly reduced to peace. If he caught any of them in the fact, he puniſhed them. Having accuſtomed them to come to me with the call of a whiſtle, when this ſignal was given, I ſaw him marſhalling them, leading them foremoſt, then ſuffering them all to file off before him." The rabbit, though leſs than the hare, generally lives longer. Are generally fatter than the hare, but their fleſh much leſs delicate.

The rabbit is native of the warmer climates, and originally imported from Spain. In that country, and its iſlands in the Mediterranean, they once multiplied to the greateſt nuiſance. At firſt military aid was demanded to deſtroy them; ſoon after they called in the ferret from Africa, which, with much more eaſe and expedition, leſſened the calamity. Rabbits love a warm climate; are incapable of bearing the cold of the north; in tropical climates ſeldom burrow.

The Syrian rabbit, like other animals of that country, is remarkable for its length of hair, which falls along the ſides in wavy wreaths, in ſome places curled like wool; is ſhed yearly in large maſſes, the rabbit often dragging a part of its robe on the ground. No rabbits naturally in America; thoſe carried from Europe multiply in the Weſt-India iſlands in great abundance.

THE MARMOTTE

IS almoſt as big as a hare, corpulent and ſhort-legged; its head reſembles a hare, but its ears are much ſhorter; is clothed with very long hair, and ſhorter fur beneath, black and grey. This length of hair increaſes its appearance of corpulence, ſo that its belly ſeems to touch the ground. Tail tufted, well furniſhed with hair, carried ſtraight with the body; five claws behind, only four before. Theſe it uſes as the ſquirrel does, to carry its food to its mouth; and often ſits on its hinder parts to feed.

Is chiefly native of the Alps; when taken young, eaſily tamed, taught to dance, to wield a cudgel, and to obey the voice of its maſter; has an antipathy to the dog; has great ſtrength, joined to great agility; has four large cutting teeth, which are formidable weapons of defence; is, in general, inoffenſive, and, except its enmity to dogs, ſeems to live in friendſhip with every creature, unleſs provoked; runs much ſwifter up hill than down; climbs trees with great eaſe, and runs up the clefts of rocks, or the contiguous walls of houſes, with great facility; eats indiſcriminately fleſh, bread, fruits, herbs, roots, pulſe, and inſects; is particularly fond of milk and butter; will ſteal into a dairy, lap the milk like a cat, purring all the while, as an expreſſion of pleaſure. Milk is the only liquor they like; ſeldom drink water, and refuſe wine. When pleaſed, yelp like puppies; when irritated, have a piercing note that hurts the ear. Are very cleanly animals, but have a diſagreeable ſcent, particularly in ſummer. Their fleſh, being fat and firm, would be very good, were not this flavour predominant.

The marmotte, though native of the higheſt mountains, where the ſnow is never wholly melted, ſeems eſpecially to feel the influence of cold, and its faculties are benumbed in winter. This extraordinary ſuſpenſion of life and motion deſerves our attention.

The marmotte, in September or October, prepares its habitation for winter reſidence, and does not quit it till April. It is a deep hole on the ſide of a mountain, ſpacious at bottom, wherein ſeveral can reſide without crowding or injury. It reſembles the letter Y; the two branches being two openings, which unite and terminate in their general apartment at the bottom. One branch ſloping downwards, and ſerving as a kind of ſink or drain; the other ſloping upwards, ſerving as a door. The

apartment at the end is warmly ſtuccoed with moſs and hay. This work is very laborious, and performed in common. Here they paſs three parts of their lives; in ſtormy weather, while it rains, and during danger; they never ſtir out except in fine weather, nor ever go far from home. When abroad, one is a centinel; and when an enemy, a man, a dog, or a bird of prey, approaches, appriſes its companions with a whiſtle. They ſtore up no food; at the approach of the winter, they cloſe the two entrances of their habitation with ſuch ſolidity, that it is eaſier to dig up the earth any where elſe. At this time they are very fat, and ſome weigh above twenty pounds; they continue ſo long, but by degrees begin to waſte, and are uſually very lean by the end of winter. When this retreat is opened, the family is diſcovered, each rolled into a ball, and covered under the hay, apparently lifeleſs; they may be taken away, and even killed, without teſtifying any great pain. Gradual and gentle warmth revives them; but they die if too ſuddenly brought near the fire.

This torpor is produced by congelation of their blood, which is naturally cold (not above 10° of heat); their internal heat ſeldom exceeds that of the air. Theſe animals, therefore, become torpid, when the external cold is too powerful for the ſmall quantity of heat in their bodies, *i. e.* when the thermometer equals ten degrees above congelation. This Mr. Buffon experienced in the bat, the dormouſe, and the hedgehog, and with great juſtice extends the analogy to the marmotte; extreme cold would kill them (if the heat of the air be above ten degrees, theſe animals revive). In this ſtate, the blood ſcarcely moving, or only in the greater veſſels, they want no nouriſhment to repair what it wears away; they become leaner in proportion to the ſlow attrition of their fluids, but not perceptibly, till after ſome months, having juſt ſufficient motion in their fluids to keep off putrefaction, and juſt ſufficient nouriſhment to ſupply the waſte of their languid circulation, they continue rather feebly alive than ſleeping.

Theſe animals produce once a year; bring three or four; they grow very faſt; live nine or ten years; are chiefly found in the Alps, where they prefer the brow of the higheſt mountains, and the ſunny ſide. The inhabitants, when they obſerve the hole, generally ſtay till winter before they open it; for if they begin too ſoon, the animal wakes, and, having a ſurpriſing faculty of digging, makes its hole deeper in proportion as they follow.

This animal is found in Poland under the name Bobak, entirely reſembling that of the Alps, except that the latter has a toe more upon its fore-foot than the former; alſo in Siberia under the name of the Jevraſka, but rather ſmaller. In Canada it is called the Monax, differing in having a blueiſh ſnout, and a longer tail.

THE AGOUTI

IS abundant in South-America, and has by ſome been called a rabbit, which it reſembles in ſize and head, but its ears are ſhort; alſo in the arched form of its back, in the hind legs being longer than the fore, and in having four great cutting teeth, two above and two below; but differs in that its hair is hard and briſtly like that of a ſucking pig, of a reddiſh brown colour; alſo its tail is ſhorter than the rabbit's, and without hair; and in the number of its toes, having but three on the hinder-feet, whereas the rabbit has five. With the hair of a hog, it has its voraciouſneſs; when ſatiated, hides the remainder for a future occaſion; gnaws every thing it comes near. When irritated, its hair ſtands erect along the back, and, like the rabbit, it ſtrikes the ground violently with its hind-feet. It burrows in the hollows of trees; eats roots, potatoes, yams, and fallen fruits in autumn; uſes its fore-paws to carry its food to its mouth; and its hind being longer than the fore, runs very ſwiftly up hill. Its ſight and hearing are good; when whiſtled to, it ſtops to hearken. The French dreſs it like a ſucking pig; the Engliſh with a pudding in its belly, like a hare. It is hunted by dogs; in a ſugar ground, where the canes cover the place, it is eaſily overtaken; in the open country, it runs with great ſwiftneſs to its retreat, and nothing but ſmoke can force it out. When forced by the dogs, it turns on the hunters, and with its hair briſtling like a hog, and ſtanding upon its hind feet, defends itſelf very obſtinately. Sometimes it bites the legs of thoſe that attempt to take it, and will take out the piece where it fixes.

Its cry, when diſturbed, reſembles that of a ſucking pig; taken young, is eaſily tamed; plays harmleſsly about the houſe, and goes out and returns of its own accord; when wild, continues in the woods; the female generally chooſes the moſt obſcure parts to bring forth; prepares a bed

a bed of leaves and dry graſs, and generally brings two; breeds twice or thrice a year, and carries her young from one place to another in the manner of a cat; lodges them when three days old in the hollow of a tree, ſuckling them but a very ſhort time; they quickly come to perfection, and probably are not long lived.

THE PACA

IS about the ſize of a hare, or larger; ſomewhat reſembles a ſucking pig in its grunting and its manner of eating; is covered with coarſe hair, but beautifully marked along the ſides with ſmall aſh-coloured ſpots, upon an amber-coloured ground; is rather more thick and corpulent than the agouti; its noſe ſhorter, and its hind feet have five toes; the ears are naked, and ſomewhat ſharp; the lower jaw ſomewhat longer than the upper; the teeth, the ſhape, and ſize of the head, are like thoſe of the rabbit; has a ſhort tail, not tufted, and its hinder legs longer than the fore; burrows like a rabbit; does not uſe its fore-paws to carry food to its mouth, but hunts for it on the ground, and roots like a hog; frequents the banks of rivers in the moiſt and warm countries of South-America; is very fat; is eaten, ſkin and all, like a young pig, as a great delicacy; defends itſelf to the laſt extremity, and is ſeldom taken alive. Not only man, but every beaſt and bird of prey watches its motions; but though its race is thus continually deſtroyed, it finds refuge, and breeds in great numbers.

The TAPETI, or Braſilian rabbit, reſembles our Engliſh ones, but is much leſs; is reddiſh on the forehead, and a little whitiſh under the throat; has no tail; has long ears, with whiſkers, like our rabbits, and black eyes; does not burrow.

The APEREA, called by ſome the Braſilian rabbit, ſeems to partake of the nature of a rabbit and a rat. The ears are like thoſe of a rat, ſhort and round; the other parts like a rabbit, except that it has but three toes on the hinder-legs.

THE

THE GUINEA-PIG

HAS been ſo long rendered domeſtic, that it is now become common in every part of the world; is leſs than a rabbit; its legs ſhorter, ſcarce ſeen, except when it moves; and the neck alſo is ſhort; ears ſhort, thin, and tranſparent; has no tail; in moving its body, lengthens like a rabbit; when at reſt, it gathers up in the ſame manner; has the rabbit lip, but its noſtrils much farther aſunder; ſome are white, ſome are red, others red and white; has four toes on the feet before, and but three on thoſe behind; ſtrokes its head with the fore-feet like the rabbit; and, like it, ſits upon the hind-feet; for which purpoſe has a naked callous ſkin on the back of the legs and feet.

Theſe animals are perfectly helpleſs, ſcarce poſſeſſed of courage to defend themſelves againſt a mouſe, but will often fight each other very obſtinately; are devoured by cats, without reſiſtance; the female ſees her young deſtroyed without attempting to protect them. Eat bran, parſley, cabbage, and moſt cultivated vegetables. The carrot-top is a peculiar dainty, and ſallad. They drink by lapping; are fond of new milk; but contented with water. When confined in a room, ſeldom croſs the floor, but generally keep along the wall; the male uſually driving the female before him; the following treading in the footſteps of the preceding. Seek the darkeſt retreats, where they ſleep together, and venture out with caution; ſtop at the entrance, liſten, look round; if they ſuſpect danger, run back. In very cold weather, run about to keep themſelves warm.

If the young ones fall into the dirt, the female takes an averſion to them; her employment ſeems to conſiſt in ſmoothing their ſkins, in diſpoſing their hair, and improving its gloſs. The male and female take this office by turns; when they have bruſhed up each other, they attend to their young, taking care to make their hair lie ſmooth, and biting them if refractory.

When aſleep, they lie flat on their bellies; love to have their fore-feet higher than their hinder; turn themſelves round ſeveral times before they lie down; ſleep with their eyes half open. The male and female never ſleep at one time; while he enjoys his repoſe, ſhe guards him, her head turned toward the place where he lies. When ſhe ſuppoſes he has had his turn, ſhe awakes him with a kind of murmuring noiſe, goes to him,

him, forces him from his bed, and lies down in his place. He does the ſame good office for her, and continues watchful till ſhe awakes.

Goes with young five weeks; brings from three to five; becomes again pregnant immediately, ſo that their multiplication is aſtoniſhing; ſuckles about twelve or fifteen days; does not ſeem to know her own, but ſuffers the young of others to drain her, to the diſadvantage of her own offspring; are produced with the eyes open, and in about twelve hours equal the dam in agility; ſhe has but two teats, yet plenty of milk; they feed on vegetables very early; they contend for the moſt agreeable food, or the warmeſt place, very obſtinately. Their manner of eating is ſomething like the rabbit; they appear alſo to chew the cud; they ſeldom drink, yet make water every minute; they grunt ſomewhat like a young pig; and expreſs pain by a more piercing note; their fleſh is indifferent food.

THE SQUIRREL.

FEW wild animals have ſo many varieties as the ſquirrel. The *common ſquirrel* is of a reddiſh brown; belly and breaſt are white; ears beautifully ornamented with long tufts of hair, of a deeper colour than the body; eyes large, black and lively; legs are ſhort and muſcular, like thoſe of the rabbit; the toes longer, and claws ſharper, fit for climbing. When eating, or dreſſing itſelf, ſits erect, like the hare or rabbit, uſing its fore-legs as hands; chiefly reſides in trees.

The *grey Virginian ſquirrel* is larger than a rabbit; greyiſh body and limbs thicker than the common ſquirrel; ears ſhorter, without tufts; upper part of the body, and external part of the legs, a fine whitiſh grey, with a beautiful red ſtreak on each ſide lengthways; tail covered with very long grey hair, variegated with black and white towards the extremity; ſeems to be common to both continents; in Sweden changes colour in winter.

The *Barbary ſquirrel* is a mixed colour, between red and black. Along the ſides are white and brown lines, very beautiful; the belly a ſky blue, ſurrounded with white. Some of theſe hold the tail erect; others throw it forward over their body.

The *Siberian white ſquirrel* in ſize equals a common ſquirrel. The *Carolina black ſquirrel* is much bigger, ſometimes tipt with white at all

the extremities. The *Braſilian ſquirrel* is a beautiful animal, remarkable for its variety of colours; belly bright yellow; head and body variegated with white, black, brown and orange colour; wants the tufts at the ears; does not climb trees, as moſt of the kind do. The *little ground ſquirrel of Carolina* is reddiſh, with blackiſh ſtripes on each ſide; alſo not delighting in trees. The *ſquirrel of New Spain* is of a deep iron-grey, with ſeven longitudinal whitiſh ſtreaks along the ſides of the male, and five along thoſe of the female.

This animal is diffuſed over all parts of the world, yet few animals are ſo tender. Thoſe of the tropical climates will only live near a warm ſun; while the Siberian ſquirrel ſcarce endures our temperature; ſome live on the tops of trees, others feed, like rabbits, on vegetables below.

The ſquirrel is neither carnivorous nor hurtful; eat fruits, nuts and acorns; is cleanly, nimble, active, and induſtrious; its eyes ſparkling; its phyſiognomy lively; generally ſits on its hinder-legs, and uſes the fore-paws as hands; theſe have five toes, one of them ſeparated from the reſt like a thumb; neſtles among the large branches of a great tree, where they fork off into ſmall ones; begins by making a kind of level between the forks, bringing moſs, twigs, and dry leaves, binds them together with great art, ſo as to reſiſt the moſt violent ſtorm. This is covered on all ſides, except a ſingle opening at top, juſt large enough to admit the little animal, which is itſelf defended by a kind of conical canopy, to throw off rain. The neſt is very commodious below; ſoft, well united, convenient and warm; and ſhelters its inhabitant from the heat of the ſun, which it ſeems to fear, and from the inclemency of winter, which it is leſs capable of ſupporting. Its ſtores are ſeldom in its neſt, but in the hollows of the tree, and never touched but by neceſſity. They bring about four or five young once a year in May. Their time of geſtation is about ſix weeks.

Seldom deſcends to the ground, but jumps from branch to branch; if alarmed, travels thus throughout the foreſt. It moves by bounds from one tree to another, at forty feet diſtance; if obliged to deſcend, runs up the next tree with amazing facility; has an extremely ſharp piercing note, expreſſive of pain, another not totally unlike the purring of a cat when pleaſed; feeds in ſpring on buds and young ſhoots; in ſummer on fruits, particularly the young cones of the pine-tree; in autumn, on the acorn, philberd, cheſnut, and the wilding; gathers now its proviſions for winter, and foreſees the ſeaſon of ſcarcity.

Great Flying Squirrel.

In Lapland and the north, ſquirrels remove by thouſands from one country to another, travelling directly forward, neither rocks, foreſts, nor waters can ſtop them. We are told by Klein and Linnæus, that on approaching a breadth of water, they return into the neighbouring foreſt, each in queſt of a piece of bark, which as a boat may waft him over; then boldly committing their little fleet to the waves, each ſits on its own piece of bark, fanning the air with its tail to drive it forwards. In this orderly manner they often croſs lakes ſeveral miles broad; often too the poor mariners are not aware of the dangers of their navigation, for if the edge of the water be calm, the middle is more turbulent. There the ſlighteſt additional guſt of wind overſets the little ſailor and his veſſel, ruins the whole navy, and ſhipwrecks two or three thouſand ſail, to the great joy of the Laplander on ſhore, who gathers up the dead bodies thrown in by the waves, eats the fleſh, and ſells the ſkins.

The ſquirrel is eaſily tamed, and becomes very familiar; loves to lie warm, and will often creep into a pocket or the boſom.

THE FLYING SQUIRREL

IS leſs than a common ſquirrel, its ſkin very ſoft, elegantly adorned with dark and light-grey fur; has large prominent black and very ſparkling eyes, ſmall ears, and very ſharp teeth. When not leaping, its tail lies cloſe to its back; but when ſpringing, is moved from ſide to ſide.

It is amazing to ſee it at one bound dart many yards, from one tree to another, in which they are aſſiſted by a peculiar formation of the ſkin, extending from the fore-feet to the hinder; when the animal ſtretches its fore-legs forward and its hind-legs backward, this ſkin is ſpread out between them, ſomewhat like that between the legs of a bat; by this increaſe of ſurface, the little animal floats in the air till the force of its firſt impulſe ceaſes, then gradually deſcends. This ſkin, when at reſt, is wrinkled up on the ſides; when the limbs are extended, forms a kind of web between them of above an inch broad on either ſide. Though thus fitted for leaping, ſeldom exerts its powers; is eaſily tamed, but apt to break away; not fond of nuts or almonds, like other ſquirrels, but chiefly pleaſed with the ſprouts of birch and cones of the pine.

OF THE

RAT KIND.

OF theſe the moſt miſchievous is the Great Rat, a new comer, but has taken too ſecure poſſeſſion to be removed; ſometimes called the Rat of Norway, but is unknown beyond the Baltic; probably came from the Eaſt-Indies.

This animal is in length about nine inches; its eyes large and black; colour of the head, and the whole upper part of the body, a light brown, mixed with tawny and aſh colour; the end of the noſe, the throat and belly, are a dirty white, inclining to grey; the feet and legs almoſt bare, of a dirty pale fleſh colour; the tail as long as the body, covered with minute duſky ſcales, mixed with a few hairs. It is chiefly in the colour that this animal differs from the Black Rat, or the Common Rat, as it was once called; but now common no longer. This new invader, in a few years after its arrival, deſtroyed almoſt the whole ſpecies: the frog alſo, which had been introduced in Ireland, has been extirpated by it.

It burrows in the banks of rivers, ponds, and ditches, and does great damage to mounds raiſed to conduct ſtreams, or confine rivers; moleſts farm-houſes; burrows in corn, eats much, and damages more; nothing eatable eſcapes its voracity. It deſtroys rabbits, poultry, and game; ſwims with great eaſe, and thins the fiſh-pond.

Produces from fifteen to twenty, three times a year; happily for us, eat each other. The large male rat generally keeps in a hole by itſelf, dreaded by its own ſpecies, as the moſt formidable enemy. Dogs and cats, but not without exception, deſtroy them, but the weaſel moſt effectually.

The Black Rat is in length about ſeven inches; the tail, near eight; colour, a deep iron-grey, almoſt black, except the belly, which is of a dirty cinereous hue. Over-run America, being introduced from Europe, and are now noxious there.

The Black Water-Rat is about the ſame ſize, has a larger head, a blunter noſe, leſs eyes, ſhorter ears, and the tip of its tail a little white. Never frequents houſes; but the banks of rivers, ditches, and ponds, where it burrows; feeds on fiſh, frogs, and inſects; and, in ſome countries, is eaten on faſt-days.

THE

THE MOUSE.

TIMID, cautious, and active, fearful by nature, familiar from neceſſity, it attends on mankind an unbidden gueſt; it never leaves its hole but to ſeek proviſion, and ſeldom ventures above a few paces; does not leave a houſe unleſs forced. The moſt feeble of quadrupeds, except the guinea-pig; never, though tamed, familiar; and, though fed in a cage, ſuſpicious. Surrounded by enemies, the owl, the cat, the ſnake, the hawk, the weaſel, and the rat, it only ſubſiſts by its amazing fecundity.

The mouſe brings forth ſeveral times in the year from ſix to ten; theſe, in a fortnight ſhift for themſelves; are ſeldom found in ricks or corn much infeſted with rats; generally chooſe that ſide of the rick from whence moſt rain is expected; and thence venture forth to drink the little drops of rain or dew at the extremities of the ſtraw; ſeldom live above two or three years; found almoſt throughout the ancient continent, and exported to the new; afraid of human ſociety, yet cloſely attending it; enemies to man, but only found where he has fixed his habitation.

The *long-tailed field-mouſe* is larger than the former; in colour, nearly reſembling the Norway rat; chiefly found in fields and gardens. The *ſhort-tailed field-mouſe*, about ſix inches long, has a tail not above an inch and a half long, ending in a ſmall tuft Its colour inclines to that of the domeſtic mouſe. This, and the former, remarkable for laying up proviſion againſt winter, ſometimes above a buſhel.

The *ſhrew-mouſe* is about the ſize of the domeſtic mouſe, but differs greatly in the form of its noſe, which is very long and ſlender. The teeth alſo are ſingular in form, and twenty-eight in number; whereas the number of the rat kind is but ſixteen. The two upper fore-teeth are very ſharp, and on each ſide is a kind of wing or beard, like an arrow, ſcarcely viſible, but on cloſe inſpection. The other teeth placed cloſe together, are very ſmall, and ſeemingly ſcarcely ſeparated. As it lives chiefly in the fields, and feeds more on inſects than corn, it may be conſidered rather as a friend than an enemy. It has a ſtrong diſagreeable ſmell; is ſaid to bring four or five young at a time.

THE

THE DORMOUSE

MAY be diſtinguiſhed into three kinds; the *greater*, the *middle*, and the *leſs*; the largeſt being equal to a rat, the leaſt no bigger than a mouſe. They differ from the rat in having the tail tufted with hair, round, reſembling a bruſh. All have black ſparkling eyes, and whiſkers, partly white and partly black; are ſtupified like the marmotte during winter, and hoard proviſions in caſe of revival by a ſunny day.

They inhabit woods or very thick hedges, neſtling in the hollow of ſome tree, or near the bottom of a cloſe ſhrub; form magazines of nuts, beans, or acorns, and ſhut themſelves up with it for the winter, rolling themſelves up in a ball. Their neſts are lined with moſs, graſs, and dead leaves; uſually bring forth three or four young in ſpring.

THE MUSK RAT.

OF theſe are three diſtinctions: the Ondatra, the Deſman, and the Pilori. The ondatra is native of Canada, the deſman of Lapland, the pilori of the Weſt-India iſlands. The ondatra differs in having the tail flatted and carried edge-ways. The deſman has a long extended ſnout like the ſhrew-mouſe; the pilori a ſhort tail, as thick at one end as the other. They reſemble each other in being fond of the water, and in that muſky odour from whence they are named.

The ondatra is the moſt remarkable; about the ſize of a ſmall rabbit; has the hair, the colour, and tail of a rat, but flatted on the ſides; can contract and enlarge its body at pleaſure. It has a muſcle like that of horſes, by which they move their hides, lying immediately under the ſkin, ſo powerfully contractile, and ſuch an elaſticity in the falſe ribs, that it can creep into an hole where others, ſeemingly much leſs, cannot follow. The female is remarkable alſo for two diſtinct apertures. Their muſky ſmell is much ſtrongeſt at one ſeaſon of the year; and the marks of the ſex ſeem to appear and diſappear in the ſame manner.

The ondatra ſomewhat reſembles the beaver in nature; lives in ſociety during winter; forms houſes of two feet and a half wide, in which reſide

reſide ſeveral families to ſhelter themſelves from the ſeaſon; but they do not lay up magazines of proviſion. They form a kind of covert way to and round their dwelling, from whence they iſſue to procure water and roots, upon which they ſubſiſt. During winter their houſes are eight or ten feet deep in ſnow. During ſummer they ſeparate two by two, and feed on roots and vegetables. They then become extremely fat, and are ſought after, as well for their fleſh as their ſkins.

THE HAMSTER

GReatly reſembles the water-rat in ſize, ſmall eyes, and the ſhortneſs of its tail; is rather browner, the belly and legs a dirty yellow; is diſtinguiſhed by two pouches on each ſide its jaw, under the ſkin, into which it crams proviſion, which it carries home for winter ſtore. Theſe are oblong, the ſize of a large walnut. They open into the mouth.

Its hole is generally on an inclining ground, always has two entrances, one perpendicular, the other oblique; (if there be many in a family, there are ſo many perpendicular holes.) The perpendicular hole is the door. Within about a foot of this are two more, containing proviſions. There is another apartment warmly lined with graſs and ſtraw, where the female brings forth. Theſe communicate with each other, and all together take up a ſpace of ten or twelve feet in diameter. Theſe animals ſtore up dry corn well cleaned, or in the ear, beans and peas in the pod. They begin to ſtore in Auguſt; as each magazine is filled, they carefully cover it with earth, ſo neatly, that it is not eaſy to diſcover where the earth has been moved; their retreats are found by obſerving the oblique entrance, which generally has a ſmall quantity of earth before it; and this, though often ſeveral yards from their home, conducts the ſkilful to the diſcovery. Many German peaſants make a livelihood by theſe hoards, which, in a fruitful ſeaſon, often furniſh two buſhels of good grain each.

They produce twice or thrice a year, and bring five or ſix. In moiſt ſeaſons, their devaſtations produce a famine. Like the reſt of their kind, deſtroy each other. Their fur is valuable; the natives are invited by rewards to deſtroy them, and the weaſel kind ſeconds their efforts.

THE LEMING

IS a native of Scandinavia, larger than a dormouſe, with a buſhy tail, half an inch long; covered with thin hair; the upper part of the head, the neck and ſhoulders, black; the reſt of the body reddiſh, with ſmall black ſpots to the tail; eyes little and black; ears round, inclining toward the back; the legs before ſhort, thoſe behind longer, which renders it very ſwift.

In wet ſeaſons, all the rat kind multiply; but this ſpecies ſo remarkably, that the Laplanders believe they drop from the clouds; they quit their native mountains in troops of millions, moving by night, in a ſquare often more than a mile broad, covering the ground, the hindmoſt touching its leader. They generally move in lines, about three feet apart, and parallel, from north-weſt to ſouth-eaſt. They go *forward*, directed by ſome ſtrange impulſe. If extenſive water interrupt their progreſs, they ſwim over it; if a fire, or a deep well, they plunge into the flames, or leap down the well; if a boat acroſs a river, while they are ſwimming, they mount directly up its ſides; if a ſtack of hay or corn, they gnaw their way through it; if a houſe through which they cannot get, they continue there till they die. Happily they eat nothing ſtored for human ſubſiſtence; but conſume roots and vegetables. If they paſs through a meadow, they deſtroy it quickly, and give it an appearance of being burnt up and ſtrewed with aſhes. If a man ſhould venture to interrupt one of them in its courſe, the little animal furiouſly flies up at its opponent, barking ſomewhat like a puppy, and, wherever it faſtens, does not eaſily quit the hold. If the leader be forced out of its line, which is very rare, it expreſſes its grief by a plaintive cry, and is ſaid not to ſurvive it. Even their breeding does not hinder their march; for ſome have been obſerved to carry one young in their mouth, another on their back. Their rapacity, at laſt, impels them to devour each other. After committing incredible devaſtations, they ſeparate into two armies, along the coaſts of the larger lakes and rivers. The Laplanders, who obſerve them thus drawn up to fight, conſider their combats as preſages of war, and expect invaſion from Ruſſia or Sweden, as the ſides next thoſe kingdoms happen to conquer. They fight till one party overcomes, and from that time diſappear, moſt probably being entirely devoured, either in rage, or as food. Often

The Mole

they are found dead by thouſands, and taint the air for miles, producing malignant diſorders. They ſeem alſo to infect the plants they have gnawed, for cattle often die that afterward feed where they paſſed.

To the Swedes and Norwegians, who live by huſbandry, ſuch an invaſion is terrible; but the Laplanders are happy when viſited by an army of lemings; they feaſt on their fleſh, though horrid food even to dogs and cats, and always expect plenty of game the year following, among thoſe fields which the lemings have deſtroyed.

THE MOLE.

THE mole is formed to live wholly under the earth, that no place ſhould be left untenanted. Is fat, ſleek, and gloſſy, and, though denied many advantages of other animals, enjoys ſome of which they are but ſcantily poſſeſſed.

Leſs than a rat and bigger than a mouſe, with a coat of fine, ſhort, gloſſy, black hair; its noſe, long and pointed; its eyes ſcarce poſſible to be diſcerned. Inſtead of ears, has only holes. Its neck ſhort; body thick and round; ſmall ſhort tail; legs alſo very ſhort; as it reſts on its belly, the feet appear growing out of its body. The ancients, and ſome moderns, thought the animal utterly blind; but Derham, by a microſcope, diſcovered all the parts of an eye. The fore-legs are very ſhort and ſtrong, furniſhed with five claws each, turned outwards and backwards, the hind-legs are longer and weaker than the fore; the teeth are like thoſe of a ſhrew mouſe, five on each ſide the upper jaw, which ſtand out; thoſe behind, divided into points. The tongue is as large as the mouth will hold.

By the breadth, ſtrength, and ſhortneſs of the fore-feet, which incline outwards, throws back the earth with eaſe; had they been longer, the falling in of the earth would have prevented the quick repetition of their ſtrokes, and they would have required a larger hole for their exertion. The fore-part of the body being thick and very muſcular, gives great ſtrength to the action of the fore-feet, enabling it to dig its way with amazing force and rapidity.

Little viſion is ſufficient for a creature who lives in darkneſs; had the organ been larger, it would have been perpetually liable to injury by

falling earth; that inconvenience is avoided by its being very ſmall, and very cloſely covered with hair. Anatomiſts mention alſo a certain muſcle, by which the animal can advance or draw back its eyes at pleaſure.

Perfectly fitted to the animal's ſituation, are alſo the ſenſes of hearing and ſmelling; by the firſt it receives notice of diſtant danger, by the other, is directed, in the midſt of darkneſs, to its food. Buried in the earth, it ſeldom ſtirs out, unleſs forced by violent rains, or when in purſuit of prey it gets into the open air, which is hardly its natural element: it chooſes the looſer ſofter grounds, beneath which it can travel with greater eaſe; where alſo it finds moſt worms and inſects, on which it chiefly preys. It is moſt active, and caſts up moſt earth, immediately before rain; and, in winter, before a thaw: at thoſe times worms and inſects being in motion, and approaching the ſurface. In dry weather, the mole ſeldom forms hillocks, but penetrates deeper after its prey.

Their greateſt calamity is an inundation; notwithſtanding every effort to reach the higher grounds, many periſh, as well as their young, which remain in their holes. Without ſuch accidents, their great fecundity would render them extremely troubleſome; and as it is, in ſome places they are conſidered by the farmer as his greateſt peſt. They couple toward the approach of ſpring, and their young are found about the beginning of May, four or five at a time. It is eaſy to diſtinguiſh that mole-hill in which the female has brought forth, by its ſize. To form this retreat, ſhe begins by erecting the earth into a tolerably ſpacious apartment, ſupported by partitions, to prevent the roof from falling; ſhe beats the earth very firm, to render it tight againſt the moſt violent rain, and raiſes it above ſlight inundations. She then procures graſs and dry leaves, as a bed for her young. All around this hill, are holes diverging into the earth, from the middle apartment, extending about fifteen feet in every direction, into which the animal makes her ſubterraneous excurſions, and by which, as ſhe is very quick of hearing, the inſtant ſhe perceives her habitation attacked, ſhe and her young always make good a retreat, unleſs the earth be dug away by ſeveral men at once.

The mole is ſcarcely found, except in cultivated countries: its varieties are but few. That of Virginia reſembles the common mole, except in colour, which is black, mixed with a deep purple. There are ſometimes white moles, particularly in Poland, rather larger than the former.

OF

OF THE

PRICKLY, OR HEDGE-HOG KIND.

THE Hedge-hog, apparently formidable, is yet harmleſs. Armed with a thouſand points, for defence, not invaſion. Deſtitute of force, cunning, or ſwiftneſs, this animal finds protection by one expedient. When attacked, it rolls itſelf up, and preſents nothing but a ball of defenſive thorns to the enemy.

This animal is of two kinds; one with a noſe like a hog, the other, more ſhort and blunt. The latter is moſt common; is about ſix inches from the tip of the noſe to the tail. The tail is little more than an inch long, concealed by the ſpines; the head, back, and ſides, covered with prickles; the noſe, breaſt, and belly, with fine ſoft hair; legs ſhort, of a duſky colour, almoſt bare; five toes on each foot, long and ſeparated; the prickles are about an inch in length, very ſharp pointed; their lower part white, middle black, and points white: the eyes are ſmall, and placed high in the head; the ears are round, pretty large, and naked; the mouth is ſmall, well furniſhed with teeth for chewing its food.

On occaſions of danger, it alters its whole appearance; bends its back, lays its head on its breaſt, ſhuts its eyes, rolls down the ſkin of its ſides toward the legs, draws theſe up, and tucks them in on every ſide, by drawing the ſkin cloſe; reſembles now not an animal, but a roundiſh maſs of prickles, not unlike a cheſnut in the huſk; having, on one ſide, a kind of flat, where the head and legs are tucked in. Thus rolled up, it waits till its enemy is fatigued by fruitleſs attacks. The cat, the weaſel, the ferret, the martin, quickly decline the combat; the dog himſelf ſeldom ſucceeds. If its aſſailant attempt to bite, he more frequently feels than inflicts a wound; enraged and barking, he rolls it along with his paws; but the hedge-hog patiently ſubmits, in ſecurity, to every indignity, and, to diſguſt its enemy, ſheds its urine. The fox, by preſſing it with its weight, often obliges the hedge-hog to put out its noſe, which he inſtantly ſeizes, and ſoon becomes maſter of the whole body: when danger is paſt, the hedge-hog peeps out from its ball, and creeps ſlowly to its retreat.

The hedge-hog ſleeps by day, and ventures out by night; reſides in ſmall thickets or hedges; makes a hole ſix or eight inches deep, lies well

well wrapped up in moſs, graſs, or leaves; eats roots, fruits, worms, and inſects.

Mr. Buffon accuſes them of tricks, not a little miſchievous. "I have often," ſays he, "had the female and her young brought me about the beginning of June; from three to five in number; white in the beginning, and ſhewing only the marks of their ſpines; willing to rear ſome of them, I put the dam and her young in a tub, with abundant proviſion; but the old animal, inſtead of ſuckling her young, devoured them all, one after another. On another occaſion, a hedge-hog, that had made its way into the kitchen, diſcovered a little pot, in which was meat prepared for boiling; the miſchievous animal drew out the meat, and left its excrements in the ſtead. In the garden they did very little damage, and it was ſcarcely perceivable that they were there: they lived on fruits that fell from the trees; they dug the earth into ſhallow holes; eat caterpillars, beetles, and worms; were alſo very fond of fleſh, boiled or raw."

They ſleep during winter; at no time eat much, and can remain very long without food. Their blood is cold, like all other torpid animals.

THE

TANREC AND TENDRAC,

ARE two little animals, deſcribed by Mr. Buffon, of the hedge-hog kind, yet different; like the hedge-hog, covered with prickles, but mixed with more hair; unlike that animal, they do not defend themſelves by rolling up in a ball. Found only in the Eaſt-Indies, where the hedge-hog exiſts alſo.

The TANREC is about the ſize of a mole; the TENDRAC ſtill leſs, defended only with prickles on the head, neck, and ſhoulders; being elſewhere covered with a coarſe hair, reſembling hog's briſtles. Having very ſhort legs, they move ſlowly; grunt like a hog, and wallow in the mire. Are chiefly in creeks and harbours of ſalt water; multiply greatly; make holes in the ground, and ſleep for ſeveral months. During this torpid ſtate, their hairs, perhaps alſo their prickles, fall, and are renewed on their revival; are uſually very fat; their fleſh inſipid, ſoft, and ſtringy, yet the Indians conſider it as a delicacy.

THE

The Porcupine

THE PORCUPINE

IS about two feet long, and fifteen inches high; covered with quills, from ten to fourteen inches long, reſembling a gooſe-quill in thickneſs, but tapering and ſharp, thickeſt in the middle, and inſerted like feathers into birds; within ſpongy, like the top of a gooſe-quill; white and black alternately from end to end; ſome fifteen inches long, and a quarter of an inch in diameter; harder than common quills, difficult to be cut, and ſolid at the point: others long, flexible, and ſlender, grow here and there among the former; ſome near the tail are white and tranſparent. Theſe quills incline backward, like the briſtles of a hog; when the animal is irritated, they ſtand upright, like briſtles.

The muzzle ſomewhat reſembles a hare, but is black; the legs very ſhort, each foot has five toes; the belly, head, and body, are covered with ſhort hair, like prickles, except the ears and the ſole of the foot; the ears are thinly covered with very fine hair, in ſhape are like the human; the eyes ſmall, only one-third of an inch in length. When ſkinned, there appear a kind of paps where the large quills grew, the ſize of a ſmall pea, anſwering to as many holes on the ſurface of the ſkin, which are about half an inch deep, wherein the quills are fixed. This formidable armour is entirely defenſive; the quills never quit the ſkin, except when the animal moults them, as birds do their feathers. Their uſual manner of defence is to lie on one ſide, and when the enemy approaches very near, by ſuddenly riſing, to wound him with the points on the other, always directing their quills to the enemy: thus amply protected, even the lion fears to attack the porcupine. Hunts ſerpents and reptiles. Travellers aſſure us that, between the ſerpent and the porcupine, exiſts irreconcileable enmity, and that they never meet without mortal engagement. The porcupine is ſaid to roll itſelf on the ſerpent.

Thoſe brought to this country are uſually fed on bread, milk, fruits, and meat. The porcupine is extremely hurtful to gardens, and does incredible damage. Lives from twelve to fifteen years; couples in September; the males become very fierce, and often deſtroy each other with their teeth. The female goes with young ſeven months, brings forth one, ſuckles it about a month, accuſtoms it betimes to vegetables and the bark of trees; ſhe is very fierce in its defence; at other ſeaſons,

is fearful, timid, and harmleſs. The porcupine never bites or injures its purſuers: if hunted by a dog or a wolf, climbs a tree, and continues there till it has wearied out the patience of its adverſary. The Indians eagerly purſue it to make embroidery of its quills, and to eat its fleſh.

The porcupines of America differ from that of the ancient continent, and may be conſidered as different ſpecies. Theſe are principally,

The COUANDO, much leſs than the porcupine; its quills about a quarter the length of the porcupine's; its ſnout little like a hare; its tail is long, catches the branches of trees, and holds by them; may be eaſily tamed; inhabits chiefly the ſouthern parts of America, yet is not wanting in the northern.

The URSON is native of Hudſon's Bay. The body of this animal ſomewhat reſembles a pig; is covered with long briſtly hair, with a ſhorter hair underneath; under this the quills lie concealed very thick; they are white, with a brown point, and bearded, and the longeſt do not exceed four inches; they ſtick to the hand when the animal is ſtroked on the back, ſometimes ſo faſt as to follow it. They neſtle under the roots of great trees, ſleep very much, chiefly feed on the bark of the juniper. In winter, the ſnow ſerves them for drink; in ſummer, they lap water like a dog; are very common in the country lying eaſt of Hudſon's Bay; and ſeveral of the trading Americans depend on them for food, at ſome ſeaſons of the year.

OF THE

MONKEY KIND.

ANIMALS of this claſs have hands inſtead of paws; ears, eyes, eye-lids, lips, and breaſts like mankind; their internal conformation bears partial likeneſs; in ſome nearer, in others more diſtant. May be divided into three claſſes, *viz.*

The Ape kind; theſe exhibit ſtrongly the human likeneſs; walk upright, want a tail, have fleſhy poſteriors, calves to their legs, and feet ſomewhat like ours.

The

The Baboon kind is a more diſtant approach to the human form, the quadruped mixing in every part: go on all fours; when upright, ſome are as tall as a man, have ſhort tails, long ſnouts, and are brutally fierce.

The Monkey kind are removed further, are much leſs, tails as long or longer than their bodies; flattiſh faces.

APES.

THE Ouran Outang, of all animals, neareſt approaches the human race; is of different ſizes, from three to ſeven feet high. In general, is leſs than a man; but its ſtrength and agility much greater. Travellers, who have ſeen them in their native ſolitudes, give ſurpriſing relations of their force, ſwiftneſs, addreſs, and ferocity. Naturaliſts at home have been equally ſtruck with their patient, pliant, imitative diſpoſitions; their appearance and conformation. That obſerved by Dr. Tyſon is beſt known, having been deſcribed with the greateſt exactneſs. It was brought from Angola in Africa; the body was covered with coal black hair, reſembling human, and longeſt where it is longeſt on the human ſpecies. The face was like that of a man, the forehead larger, the head round; the jaws were not prominent, as in monkies, but flat; the ears were like human in moſt reſpects; and the teeth, as alſo the bending of the arms and legs.

The differences were the flatneſs of the noſe, the lowneſs of the forehead, the want of chin; the ears were too large, the eyes too cloſe, the noſe and mouth too diſtant, the thighs too ſhort, the arms too long, the thumb too little, and the palm of the hand too narrow. The feet were more like hands than feet, and the animal bent too much on its haunches. It differed in the number of its ribs, having thirteen; whereas, in man, are but twelve. The tongue, and the organs of voice, were the ſame, yet the animal was dumb; the brain was the ſame, yet he wanted reaſon.—Profeſſor Camper has ſince obſerved a ſlit in the gullet of this animal, through which the air, neceſſary to form a voice, eſcapes in a whiſtle.

This animal was very hairy behind; but before, the hair was much thinner, the ſkin appeared, and in ſome places was almoſt bare. When on all fours, it appeared all hairy; when erect, it appeared leſs hairy. The face, hands, and ſoles of the feet, were without hair, and moſt of the forehead; down the ſides of the face the hair was thick, an inch and a half long. The palms of the hands were as long as the ſoles of the

feet; the toes as long as the fingers; the middle toe longeſt. The animal often uſed his hinder feet as hands; ſometimes its hands inſtead of feet.

In its paſſage to England, thoſe it knew on ſhip-board, it would embrace with great tenderneſs, opening their boſoms, and claſping its hands about them. Monkies of a lower ſpecies it held in averſion; always avoided the place where they were kept in the ſame veſſel. After it was a little uſed to wear clothes, it grew very fond of them; part it would put on without help; the reſt it would carry in its hands to ſome of the company, for their aſſiſtance. It would lie in a bed, place its head on the pillow, and pull the clothes upwards, as a man would do.

Mr. Buffon deſcribes one, which, ſays he, I have ſeen give its hand to ſhow the company to the door, ſit at table, unfold its napkin, wipe its lips, uſe the ſpoon and the fork to carry the victuals to its mouth, pour out its drink into a glaſs, touch glaſſes when invited, take a cup and ſaucer and lay them on the table, put in ſugar, pour out its tea, leave it to cool before drinking, and this often of its own accord.

However, many of theſe extraordinary habits were probably the reſult of education. It is very ſuppoſable the moſt perfect of this kind are generally prone like quadrupeds, for when we examine the palms of their hands, and the ſoles of their feet, we find both equally callous and beaten; a proof that both have been equally uſed. It is even ſaid, that when they are taken, their hands are tied behind them, to teach them to walk upright; and, thus educated, an ape, or a quadruped, may be an admirable object for human curioſity, but little advanced in regard to its own felicity; its conveniencies for its manner of life are neither improved nor augmented: all its acquiſitions are uſeleſs to itſelf, and calculated to cauſe wonder in ſpectators, not to rank their poſſeſſor a ſingle ſtep higher in the ſcale of being.

Pyrard relates, that in Sierra Leona, in Africa, are a kind of apes, called Baris, ſtrong and muſcular, which walk upright, pound at a mortar, go to the river to fetch water, in a little pitcher, on their heads; but if care be not taken to receive the pitcher at their return, let it fall, and then, ſeeing it broken, cry for their loſs.

The gigantic races of the Ouran Outang are truly formidable; are as tall or taller than a man; active, ſtrong, intrepid, cunning, laſcivious, cruel; found in many parts of Africa, in the Eaſt-Indies, in Madagaſcar, and in Borneo. In the laſt, the people of quality courſe him as we do the ſtag.

The

The long-arm'd Monkey

The Magot.

The African Pongo walks on his hinder legs, ſleeps under trees, builds a hut to protect him againſt the ſun and the rains; lives only on fruits; not carnivorous. When the negroes make a fire in the woods, this animal comes near and warms himſelf by the blaze, but has not ſkill to keep the flame alive by feeding it with fuel. They go in companies; if they meet a man, ſhew him no mercy; attack the elephant with clubs, and drive him from that part of the foreſt which they claim. Are ſtronger than ten men.

The Ape, properly ſo called, or the Pithekos of the ancients, is not above a foot and a half high; walks erect, without a tail, and is eaſily tamed.

The Long-armed Ape is from two feet to four feet high, walks erect, without a tail, face reſembling man, a circle of buſhy hair round the viſage, eyes are large and ſunk in its head, face tanned, ears well proportioned. When it ſtands erect, its arms reach the ground; ſo that it can walk on all fours, yet be erect at the ſame time. Native of the Eaſt-Indies, particularly the coaſt of Coromandel.

The Cynocephalus, or Magot (of Buffon) wants a tail, but has a ſmall protuberance formed by the ſkin; alſo a large callous red rump; face prominent, approaching the quadruped; covered with a browniſh hair; yellow on the belly; three feet and a half or four feet high; native of Africa and the Eaſt; ſullen, vicious, and untractable.

BABOONS.

THESE animals have a ſhort tail, a prominent face, canine teeth larger than thoſe of men, and calloſities on the rump; fierce, malicious, and untractable.

The Baboon, properly ſo called, is from three to four feet high, very ſtrong built, thick body and limbs, and long canine teeth; large calloſities behind, quite naked and red; tail crooked and thick, ſeven or eight inches long; its ſnout long and thick; on each ſide of its cheeks, a pouch, into which, when ſatiated with eating, it puts the remainder; covered with long thick hair, reddiſh brown; walks commonly on all fours; hands as well as feet armed with long ſharp claws, inſtead of the broad round nails of the ape kind.

When they rob an orchard or vineyard (for they are extremely fond of grapes, apples, and ripe fruit), they go in large companies; part enter the incloſure, but firſt ſet a centinel; the reſt form a line from their fellows within, to their rendezvous in ſome craggy mountain; thoſe within the orchard throw the fruit to thoſe without, or, if the wall be high, to thoſe on the top, and theſe to thoſe beyond them, all along the line: while this is going forward with great expedition, they obſerve a profound ſilence.

The natives of the Cape often take them young, and, feeding them with milk, accuſtom them to guard their houſes. Inhabit alſo Siam.

The largeſt of the baboon kind is the Mandril; ugly and diſguſting, ſhort, from four to five feet high; muzzle long, of a blueiſh colour, ſtrongly marked with wrinkles; from the noſe iſſues a ſnot, which the animal at intervals licks off with its tongue; is native of the Gold Coaſt; ſaid to walk frequently erect, and, when diſpleaſed, to weep like a child.

The Wanderow is rather leſs than the former; tail from ſeven to eight inches long; muzzle prominent; has a large long white head of hair, with a monſtrous white beard, coarſe, rough, and deſcending; the colour of the reſt of the body brown or black; equally fierce; yet ſeems more tractable than moſt of its kind; is chiefly ſeen in the woods of Ceylon and Malabar.

The Pigtail is in ſize no larger than a cat; has a prominent muzzle; the tail five or ſix inches long, curled up like that of a hog; native of Sumatra. Edwards kept one of them in London; another happening to be expoſed in a ſhew of beaſts, he brought the two exiles together. The moment they came into each other's preſence, they teſtified their mutual ſatisfaction, and ſeemed quite tranſported at the interview.

MONKIES

HAVE numerous varieties: Boſman mentions above fifty ſorts on the Gold Coaſt alone; and Condamine aſſerts, that it would take a volume to deſcribe thoſe along the river Amazons; ſcarce a country in the tropical climates that does not ſwarm with them; ſcarce a foreſt that has not a race diſtinct from all others; for the monkies of two cantons

cantons never mix with each other, but rigorouſly obſerve a ſeparation, and guard their limits from the intruſion of ſtrangers. Neither the tiger nor the lion will venture to diſpute their dominion, ſince they, from the tops of trees, continually carry on an offenſive war, and by their agility eſcape purſuit. The ſerpent is their chief deſtroyer, and is often ſeen winding up the trees where they reſide, and if it happen to ſurpriſe them ſleeping, ſwallows them before the little animals have time for defence. The monkies in general inhabit the tops of trees; the ſerpents, branches nearer the bottom.

To the Negroes they are their greateſt plague, and do incredible damage, plundering pretty much like the baboons; are not contented with the firſt blade of corn, or the firſt cane, but pull up the moſt alluring, turn it round, examine, compare it with others, and if they find it to their mind, ſtick it under one of their arms.

They generally keep in companies, march in order, and obey the voice of ſome chieftain, remarkable for his ſize and gravity. One ſpecies, which Mr. Buffon calls the Ouarine, is remarkable for loudneſs and diſtinctneſs of voice, ſtill more for their uſe of it. "I have frequently been a witneſs," ſays Margrave, "of their aſſemblies. Every day, morning and evening, the ouarines aſſemble in the woods. When all come together, one among the number takes the higheſt place on a tree, and makes a ſignal with his hand to the reſt to ſit round, in order to hearken. As ſoon as he ſees them placed, he begins his diſcourſe, with ſo loud a voice, and yet in a manner ſo precipitate, that to hear him at a diſtance, one would think the whole company were crying out at the ſame time: however, during that time, one only is ſpeaking, and the reſt obſerve the moſt profound ſilence. When this has done, he makes a ſign with the hand for the reſt to reply; and at that inſtant they raiſe their voices together, until by another ſignal of the hand they are enjoined ſilence. This they as readily obey; till, at laſt, the whole aſſembly breaks up, after hearing a repetition of the ſame preachment."

The chief food of the monkey-tribe is fruits, buds of trees, ſucculent roots and plants; are fond of ſweets, particularly the pleaſant juice of the palm-tree and the ſugar-cane. In neceſſity, eat inſects and worms; if near the coaſts, oyſters, crabs, and ſhell-fiſh. Catch oyſters by clapping a ſtone between the opening ſhells; draw crabs from the water, by putting their tail to the crabs' hole, the crabs faſtening on it, they draw them on ſhore with a jerk. The monkey brings one at a time, ſometimes two.

Father Carli, in his hiſtory of Angola, aſſures us, that while his health was impaired by the raging heats of the climate, his patience exhauſted by the obſtinacy of the natives, and his little proviſions daily plundered, without redreſs, he found more faithful ſervices from monkies than from men; theſe he had taught to attend him, to guard him, while ſleeping, againſt thieves and rats, to comb his head, to fetch his water; and he aſſerts, that they were more tractable than the human inhabitants.

The monkies of Africa, &c. may be diſtinguiſhed from thoſe of America by three marks. (1) A naked callous ſubſtance behind, on which they ſit; which thoſe of America are without. (2) Noſtrils differently formed, opening downward; whereas the American monkies open on each ſide. (3) Pouches on each ſide the jaw, into which they put proviſion; which thoſe of America are without. Alſo, no monkies of the ancient continent hang by the tail, as do many of the American.

Mr. Buffon, who has examined this race of beings with great accuracy, makes nine ſpecies belonging to the ancient continent.

(1) The Macaguo, ſomewhat reſembling a baboon in ſize, ſtrength of body, and an hideous wrinkled viſage; but differs in having a very long tail, covered with tufted hair: native of Congo.

(2) The Patas is about the ſame ſize, has a longer body, and face leſs hideous; is remarkable for its colour, which is ſo brilliant a red, that the animal looks as if it were painted: by ſome called the Red African Monkey.

(3) The Malbrouk, of which he ſuppoſes the Bonet Chinois to be a variety. One is remarkable for a long tail and beard; the other for a cap of hair, that covers the crown of the head, from whence it takes the name: natives of the Eaſt-Indies. The Bramins have hoſpitals for ſuch of them as happen to be ſick or diſabled.

(4) The Mangabey may be diſtinguiſhed by its eye-lids, which are naked, and of a ſtriking whiteneſs: native of Madagaſcar.

(5) The Mona, or Cephus of the ancients, is variegated with black and red; its tail of an aſh-colour, two white ſpots on each ſide, at its inſertion: native of the northern parts of Africa.

(6) The Callitrix, or Green Monkey of St. Jago, diſtinguiſhed by its beautiful green colour on the back, its white breaſt and belly, and its black face.

(7) The

The Coaita

(7) The Mouſtoc, or White Noſe, diſtinguiſhed by the whiteneſs of its lips, the reſt of the face being a deep blue: native of the Gold Coaſt.

(8) The Talapoin, diſtinguiſhed by its variety of green, white, and yellow hair; that under the eyes being of a greater length than the reſt: ſuppoſed to be native of Africa and the Eaſt.

(9) The Douc, ſo called in Cochinchina, where it is native; with a long tail; of a ſize as large as the baboon, and with a flat face like the ape; reſembles the American monkies, in having no callus on its poſteriors.

The monkies of the new continent, Mr. Buffon divides into thoſe with muſcular holding tails, called SAPAJOUS; thoſe with feeble, uſeleſs tails, called SAGOINS. Of the ſapajous are five ſorts; of the ſagoins, ſix.

OF THE SAPAJOUS.

The firſt is the Ouarine, or the Brazilian Guariba; as large as a fox, with black long hair, deſcribed p. 115; is the largeſt monkey of America. This is often called the *Preacher*.

(2) The Coaiti is diſtinguiſhed by having no thumb, conſequently, but four fingers on the two fore-paws. The tail, however, ſupplies the defects of the hand; and with this the animal flings itſelf from one tree to another, with ſurpriſing rapidity.

(3) The Sajou is diſtinguiſhed by its yellowiſh, fleſh-coloured face.

(4) The Sai is ſomewhat larger, and has a broader muzzle; called alſo the Bewailer, from its manner of lamenting, when either threatened or beaten.

(5) The Samiri, or Aurora, is the ſmalleſt and moſt beautiful of all; of a fine orange colour, with two circles of fleſh round the eyes; a very tender, delicate animal.

OF THE SAGOINS.

(1) The Saki, or Sagui, ſo remarkable for the length of the hair on its tail, that it has been often termed the Fox-tailed Monkey; is of different ſizes.

(2) The Tamaim is uſually black, with the feet yellow; ſome brown, ſpotted with yellow.

(3) The Ouiſtiti is remarkable for large tufts of hair on its face, and its annulated tail.

(4) The Marikina, or Lion Monkey, with a mane round the neck, and a bunch of hair at the end of the tail, like a lion.

(5) The Pinch, with the face of a beautiful black, and white hair deſcending on each ſide the face.

(6) The Mico. The hair on its body a beautiful ſilver colour, brighter than that of the moſt venerable human hair; the tail, a deep brown, inclining to blackneſs; its ears, its cheeks, and lips, tinctured with bright vermillion; a very ſmall kind.

THE

MAKI, OR MOCOCO KIND,

FROM the conformation of their hands and feet, approach the monkey kind; but in that reſpect only. There are many kinds, varying in colour or ſize, but agreeing in the human-like figure of their hands and feet, and in their long noſe.

The Mococo is about the ſize of a cat; the body and limbs ſlenderer; a very long tail, at leaſt double the length of its body; covered with fur, marked alternately with broad rings of black and white; remarkable for the largeneſs of its eyes, which are ſurrounded with a broad black ſpace; and the length of the hinder-legs, which far exceed thoſe before. When it ſleeps, it brings its noſe to its belly, and its tail over its head. When it plays, it uſes a ſort of galloping, with its tail raiſed over its back, and continually in motion. The head is covered with dark aſh-coloured hair; the back and ſides, with a red aſh-colour, not ſo dark as the head; the whole gloſſy, ſoft, and ſmooth, and ſtanding almoſt upright, like the pile of velvet. Native of Madagaſcar; a gentle animal; moves, like all four-handed animals, in an oblique direction.

The Mongooz is leſs than the former, with a ſoft, gloſſy robe, but a little curled; noſe alſo thicker; eyes black, orange-coloured circles round the pupil; ſome black, others brown: native of Madagaſcar.

The Female Oppoſſum

The Vari is much larger than either of the former; its hair much longer; has a kind of ruff round the neck, of very long hair, by which it may be diſtinguiſhed from the reſt; fierce and ſavage; its voice ſomewhat reſembles the roaring of the lion: native of Madagaſcar.

To this tribe we may refer a little four-handed animal, of the iſland of Ceylon, which Mr. Buffon calls the Lori; of all quadrupeds the longeſt, in proportion to its ſize; having nine vertebræ in the loins; whereas others have only ſeven. The body appears longer, by having no tail; reſembles the maki kind in its hands, feet, ſnout, and the gloſs of its hair; about the ſize of a ſquirrel; and appears to be a tame, harmleſs little animal.

OF THE

OPPOSSUM KIND.

THESE ſeem to unite the monkey and the rat; are leſs than the former; have long tails, almoſt bare; their fur, as well as their ſhape, reſembling the rat kind. Some have ranked them in that claſs; but their being four-handed is ſufficient diſtinction.

The Oppoſſum is found in N. and S. America, in Java, &c. the ſize of a ſmall cat. The head reſembles a fox; has fifty teeth in all, two great ones in the midſt, like thoſe of a rat; eyes little, round, clear, lively, placed upright; ears long, broad, tranſparent, like thoſe of the rat kind; its tail round, long, a little hairy in the beginning, but quite naked towards the end; fore-legs ſhort, about three inches long; thoſe behind, four. The feet are like hands, each having five fingers, with white crooked nails, rather longer behind than before. In this animal, the thumb on the hinder-leg wants a nail, whereas the fingers are furniſhed with clawed nails as uſual. Remarkable for a falſe womb, into which the young, when brought forth, creep, and continue to lodge and ſuckle ſecurely: which is thus deſcribed:

Under the belly of the female is a kind of ſlit or opening, three inches long, compoſed of a ſkin, which makes a bag internally, covered on the inſide with hair; herein are the teats of the female, and into it the young retire. This bag is opened or ſhut at the will of the animal, and

ſo

ſo cloſe, that in the living animal the opening can ſcarce be diſcerned. This bag contains glands that exude a muſky ſubſtance, which communicates to the fleſh of the animal, and renders it unfit to be eaten. The young, when firſt produced, are in a manner but half completed (and ſome aſſert, not much larger than flies); on quitting the womb, they creep into the receptacle, where they continue *fixed* to the teat till they have acquired ſtrength ſufficient. On their firſt entrance, they ſeldom ſtir out; when more advanced, they venture forth often in the day; at laſt, ſeldom uſe their retreat, except in neceſſity.

The Oppoſſum, on the ground, is ſlow and helpleſs; but climbs trees with great expedition; chiefly ſubſiſts on birds; hides among the leaves of the trees to ſeize them by ſurpriſe; often hangs by the tail, which is long and prehenſile, for hours, head downwards, watching for prey. If any animal paſs underneath, it drops upon and quickly devours it. By means of its tail, ſwings from one tree to another, hunts inſects, and eſcapes purſuers. Seems to live on vegetable as well as animal ſubſtances, ſugar-canes, the bark, and even the leaves of trees. Is eaſily tamed, but is a diſagreeable domeſtic.

The Marmoſe, found in South-America, ſeems only to differ in ſize, being leſs; and, inſtead of a bag to receive its young, has only two longitudinal folds near the thighs. The young, when firſt produced, are not above the ſize of a bean; but continue ſticking to the teat, until they have arrived at greater maturity.

The Cayopolin is ſomewhat larger, its ſnout more pointed, its tail longer, and its colour different, being aſh, inclining to yellow.

The Phalanger, or Surinam Rat, reſembles the former, but differs by the thumb and fore-finger of its hinder-hands being joined together, except at the extremities; is about the ſize of a rat.

The Tarſier reſembles the former, in having four hands and a long tail; differs in the extreme length of its hinder-legs, which are longer than its whole body. The bones of that part of the foot called the tarſus, are likewiſe very long; from whence the animal has received its name: the tail is naked in the middle, and hairy at both extremities; its hair woolly, ſoft, and a deep aſh colour.

OF

AMPHIBIOUS QUADRUPEDS.

ALL quadrupeds of this kind, though covered with hair, are furniſhed with membranes between the toes. Their paws are broad, their legs ſhort, fitted for ſwimming, for taking ſhort ſtrokes, and quickly repeating them. Some, like the otter, reſemble quadrupeds, except as being web-footed; others, like the beaver, are not only web-footed, but have the tail covered with ſcales. Others, as the ſeal and the morſe, have the hind-feet ſtuck to the body like fins. And others, as the manati, have no hind-feet, and never come on ſhore. But all get their living in the water; all continue long under water; when preſt by danger, fly to the water for ſecurity; and, when upon land, are timorous and unwieldy.

The OTTER reſembles quadrupeds in ſhape, hair, and internal conformation; but reſembles the aquatic tribes in its manner of living, and in having membranes between the toes to aſſiſt it in ſwimming. It ſwims even faſter than it runs, and can overtake fiſhes in their own element. Its colour is brown; it is long, ſlender, and ſoft ſkinned; is about two feet long from noſe to tail; the head and noſe are broad and flat; the neck ſhort; the body long; the tail broad at the inſertion, but tapering to a point; the eyes are very ſmall, and placed nearer the noſe than uſual in quadrupeds; legs very ſhort, but remarkably ſtrong, broad and muſcular. Their joints articulated ſo looſely, that the animal can turn them quite back, and bring them on a line with the body, ſo as to perform the office of fins. Each foot is furniſhed with five toes, connected by ſtrong broad webs like thoſe of water fowl.

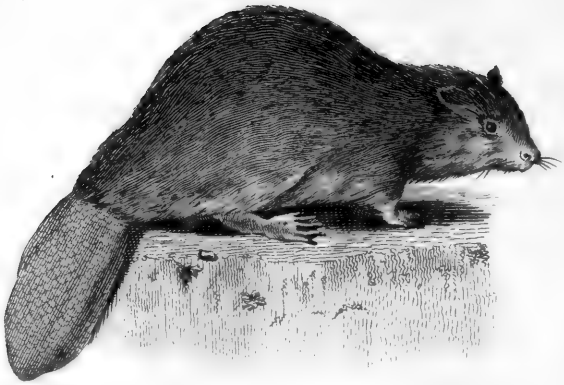
The otter attends the ſides of lakes and rivers, but particularly the former; is ſeldom fond of fiſhing in a running ſtream; but in rivers always ſwims againſt the ſtream, and meets the fiſhes, its prey, rather than purſues them. In lakes it deſtroys much more than it devours, and often ſpoils a pond in a few nights. The otter catches its prey from the bottom upward, or, purſuing it into ſome little creek, ſeizes it there. This animal, upon taking in a quantity of air, can remain ſome minutes at the bottom: there whatever fiſh paſſes over it is certainly taken; for, as

the eyes of fiſh are placed ſo as not to ſee under them, the otter ſeizing them by the belly, drags them on ſhore, where it often leaves them untouched, to continue the purſuit for hours. In winter, when the lakes are frozen, and the rivers pour a rapid torrent, the otter is often greatly diſtreſſed, and obliged to live on graſs, weeds, and even bark; then courageous from neceſſity, it feeds on inſects, rats, and even ſheep. It has the power of continuing long without food, and, though not torpid like the marmotte, yet keeps much within its retreat, which is uſually the hollow of a bank worn under by the water. There it often forms a kind of gallery, running along the edge of the water; when attacked at one end, it flies to the other, and often evades the hunter by plunging into the water at forty or fifty paces diſtance, while he expects to find it juſt before him. Couples about the middle of ſummer, and brings forth at the end of nine weeks, generally three or four at a time. The otter brings forth generally under hollow banks, on a bed of ruſhes, flags, or weeds, on the ſide of ſome river or lake. The entrance of its hole is generally under water. The young are always at the water-edge; the dam teaches them to plunge ſwiftly, like herſelf, and eſcape among the ruſhes or weeds. Though never ſo young, they ſwim with great rapidity, no part of them being ſeen above water, except the tip of the noſe.

When caught young, they are carefully fed with ſmall fiſh and water; but, as they gather ſtrength, milk is mixed among their food, their fiſh proviſion is gradually retrenched, and at length they are fed wholly on bread. The training them to hunt for fiſh requires aſſiduity and patience; but an otter, thus taught, is a valuable animal, and will catch fiſh enough not only for itſelf, but for a family. Has been ſeen, at the word of command, to drive fiſh into a corner, and bring off the largeſt to its maſter.

Otters inhabit moſt parts of the world; different in ſize and colour. In North-America and Carolina are white, inclining to yellow. The Braſilian otter is much larger than ours, with a roundiſh head, almoſt like a cat. The tail is but five inches long; the hair is ſoft, ſhort, and black, except on the head, where it is of a dark brown, with a yelloviſh ſpot under the throat.

THE



The Beaver.

THE BEAVER.

THE Beaver, merely as an individual, is exceeded by many other quadrupeds in cunning, and by almoſt all in powers of defence. When kept in a ſtate of ſolitude or tameneſs, is gentle and familiar enough, dull, and even melancholy; of moderate paſſions and appetites; calm and indifferent, without attachment or antipathy, neither ſeeking to offend, nor deſiring to pleaſe; has little induſtry, few tricks, nor cunning ſufficient to avoid the moſt obvious ſnares. The only quadruped that has a flat broad tail, covered with ſcales, which, as a rudder, directs its motions in the water. The only quadruped that has membranes between the toes on the hind feet only, and none on the fore feet, which ſupply the place of hands, as in the ſquirrel. The only animal in its fore parts reſembling a quadruped, in its hinder parts a fiſh; is about two feet long, near one foot high, ſhaped ſomewhat like a rat. Its colour, a light brown; the hair of two ſorts; one longer and coarſer; the other ſoft, fine, ſhort, and ſilky. The teeth are like thoſe of a rat or a ſquirrel, long, ſtrong, admirably adapted to cutting timber or ſtripping bark; has but one vent for the emiſſion of its excrements, and its urine.

The beavers aſſemble in June and July from every ſide, and generally form a company of above two hundred. The place of meeting is commonly where they fix their abode, and always by the ſide of ſome lake or river. If it be a lake in which the waters are always level, they omit building a dam; but on a running ſtream, ſubject to floods and falls, they build a dam or pier, that croſſes the river, to form a dead water above and below; built where the river is ſhalloweſt, and where ſome great tree grows by the ſide, which they make a principal part in their building; and ſet about cutting it down. This they accompliſh by their teeth, which ſoon lay it level, and on the ſide they wiſh it, which is always acroſs the ſtream. Then cutting off the top branches, they make it lie cloſe and even, as the principal beam of their fabric.

The dam is ten or twelve feet thick at the foundation, ſloping on that ſide next the water; on the oppoſite ſide perpendicular; towards the top, about two feet broad, made of wood and clay. They raiſe the dike according to the elevation of the water. They ſwim with their clay mor-

tar on their tails, and with ſtakes between their teeth, to where they are wanted.

The dike being completed, they next erect their ſeveral apartments, which are either round or oval, and divided into three ſtories, one above the other: the firſt below the level of the cauſeway, is for the moſt part full of water; the other two above it, that in caſe of the water's increaſe, they may move a ſtory higher. If they find any little iſland contiguous to their reſervoir, they occupy it, and improve their dwelling. They drive piles into the earth, to ſecure their habitation againſt the wind as well as water. They make two apertures, at the bottom, to the ſtream; one a paſſage always kept neat and clean; the other for conveying ſoil of all ſorts. A third opening or door-way, much higher, prevents their being ſhut up when the froſt and ſnow have cloſed the apertures of the lower floors. Sometimes they build on land; but ſink trenches five or ſix feet deep, to deſcend into the water.

In Auguſt, or September, they begin to lay in ſtores. During ſummer, they regale themſelves on the choiceſt fruits and plants. In winter, their proviſions are the wood of the birch, the plane, and ſome few other trees, which they ſteep in water in quantities proportioned to their numbers. They cut down branches from three to ten feet in length. According to ſome curious naturaliſts, the ſtock of timber for ten beavers, is about thirty feet in a ſquare ſurface, and ten in depth. They regularly take out thoſe parcels only which have been duly ſteeped in the water, and impartially divide it.

The hunters, knowing that green wood is more acceptable to them than what is dry, plant a quantity of it round their lodgments; and when they come out to partake of it, catch them in ſnares, or take them by ſurpriſe. When the froſts are very ſevere, they ſometimes break a large hole in the ice; and when the beavers reſort thither for freſh air, either kill them with their hatchets, or cover the opening with a large ſubſtantial net. After this, they undermine the whole fabric; whereupon the beavers fly with the utmoſt precipitation to the water; and plunging into the aperture, fall into the net, and are taken.

THE

The Phoca.

THE SEAL, OR PHOCA.

THE Seal reſembles a quadruped in ſome reſpects, and a fiſh in others. The head is round; the noſe broad; the teeth like thoſe of a dog; the eyes large and ſparkling; no external ears, but holes; the neck of a moderate length; the body thickeſt at the ſhoulders; from whence the animal tapers to the tail. The body is covered with a thick briſtly ſhining hair, which looks as if rubbed over with oil. The feet of this animal, though furniſhed with the ſame number of bones as quadrupeds, yet are ſo ſtuck on the body, and covered with a membrane, that they reſemble fins, except by their claws. The fore-feet are greatly hid under the ſkin, and are covered with a thick ſkin, which ſerves like a fin, for ſwimming; have five claws, long, black, and piercing. The hind-feet are ſtretched out on each ſide the ſhort tail, covered alſo with a hairy ſkin, and almoſt joining at the tail. Theſe being turned backwards, are uſeleſs on land; ſo that when the animal moves, it drags itſelf forward by its fore-feet.

This animal is found from four feet long to nine; ſome black, others ſpotted, white, or yellow. Were the ſize of the brain to determine the quantity of underſtanding, the ſeal would of all animals be the moſt ſagacious; for it has, in proportion, the largeſt brain of any, but the ſize of its brain furniſhes it with little increaſe of wiſdom. Its tongue is forked or ſlit at the end, for what purpoſe we are ignorant. By a ſingularity of conformation, the *foramen ovale* in the heart is open; ſo that, though the blood of this animal *commonly* circulates through the lungs, yet it *can* circulate directly through the heart, whereby, being under no immediate neceſſity of breathing, the vital motions are carried on while in the water: but though it can continue ſeveral minutes under water, yet it is not able, like fiſhes, to remain there for any length of time; is ſeldom found diſtant from the ſhore, but baſking on the rocks; when diſturbed, plunges at once to the bottom. Numbers are generally ſeen together; found in every climate, but in the north and icy ſeas particularly, by thouſands, baſking on the rocks, and ſuckling their young. They are animals of paſſage, and perhaps the only quadrupeds that emigrate. On the north coaſts of Greenland they retire in July, and return in September. They make a ſecond departure in March to caſt their young, and return in June, young and all together, obſerving in their route a certain fixed time and track, like birds of paſſage. The females

in our climate bring forth in winter, and rear their young on ſome ſand-bank, rock, or deſolate iſland. Suckle their young, ſitting up on their hinder legs. The ſeals follow and deſtroy the herrings when in the ſhoals by thouſands. They are very ſwift in deep waters, dive rapidly, and, while the ſpectator eyes the ſpot, they emerge an hundred yards diſtance. The weaker fiſhes, therefore, can eſcape their tyranny, only by darting into the ſhallows. They are extremely watchful, ſleep ſeldom longer than a minute, then raiſe their heads; if they ſee no danger, lie down again. The only method to procure them, is to ſhoot them: if they eſcape, they haſten to the deep, flinging ſtones and dirt behind them as they ſcramble along crying; if overtaken they vigorouſly reſiſt with their feet and teeth, till killed.

A variety of this animal, is the Sea-lion, deſcribed in Anſon's voyage, from eleven to eighteen feet long. So fat that the blubber lies a foot thick all round the body. Differs from the ſeal, as it often grazes along the ſhore, and on the long graſs that grows up the edges of brooks.

THE MORSE.

THE Morſe has very particular formation of teeth, having two large tuſks pendent from the upper jaw; it alſo wants cutting teeth. In form reſembles a ſeal, but is from twelve to ſixteen feet long. Generally frequent the ſame places, have the ſame habitudes, the ſame advantages, and the ſame imperfections as ſeals. The tuſks are from two to three feet long; and the ivory of the fineſt quality.

THE MANATI

NEVER leaves the water, and lives only there; is not a quadruped, for it has but two legs; nor is it a fiſh, for it is covered with hair. It forms a link uniting the two tribes; the laſt of beaſts, or the firſt of fiſhes.

The Manati is ſomewhat ſhaped like the ſeal; has the fore legs pretty ſimilar, with four claws only: ſhorter in proportion, and placed nearer the head; its tail is that of a fiſh, ſpread out broad, and wanting even the rudiments of thoſe bones which make the legs and feet. The largeſt are twenty-ſix feet long; the ſkin is blackiſh, very tough, and hard; having a few hairs ſcattered, like briſtles, of about an inch long. The eyes are very ſmall, in proportion to the animal's head; and the ear-holes

holes ſo narrow as ſcarce to admit a pin's head. The tongue is ſo ſhort, that ſome have pretended it has none at all; and the teeth are compoſed of two ſolid white bones, running the whole length of both jaws, and formed merely for chewing. The female has breaſts placed forward; brings one at a time: which ſhe holds with her paws to her boſom; where it ſticks, and accompanies her wherever ſhe goes.

This animal never leaves the water, but advances its head out of it, to reach the graſs on the river ſides. Feeds entirely on vegetables; is never found far in the open ſea, but chiefly in the large rivers of South America, and often two thouſand miles from the ocean. Is alſo found near Kamtſchatka. Has no voice nor cry; the only noiſe it makes, is by fetching its breath hard.

THE HIPPOPOTAMUS

SHOULD perhaps have been placed firſt in the liſt of amphibious; but that the otter being native of our own country, has ſo much greater probability of being known, either by inſpection or deſcription, to the reader. It uſually forms a diſtinct genus, and may be ſo conſidered here. Is above ſeventeen feet long, from the ſnout to the tail; above ſixteen feet in circumference round the body; and above ſeven feet high: the head is near four feet long, and above nine feet in circumference. The jaws open about two feet wide, and the cutting teeth, of which it hath four in each jaw, are above a foot long. Its feet are divided into four parts; tail ſhort, flat, and pointed; the hide amazingly thick, and though not capable of turning a muſket-ball, impenetrable to the blow of a ſabre. The body is covered over with a few ſcattered hairs, of a whitiſh colour. The whole figure of the animal is ſomething between that of an ox and a hog, and its cry between the bellowing of the one, and the grunting of the other.

Chiefly reſides at the bottom of the great rivers and lakes of Africa, where it leads an indolent kind of life, ſeldom diſpoſed for action, except when excited by hunger. Upon ſuch occaſions, three or four, at the bottom of a river, near ſome cataract, form a kind of line, and ſeize on ſuch fiſh as are forced down by the ſtream. In water they purſue their prey with great ſwiftneſs and perſeverance; ſwim with much force, and remain at the bottom thirty or forty minutes without riſing to take breath. They walk on the bottom of the ſtream, as if on land. On

land it is awkward and unwieldy, moves but ſlowly; ſeldom forſakes the margin of the river; ſinks every ſtep it takes. If forced, by famine, into the higher grounds, commits dreadful havock among the plantations: the natives ſee their poſſeſſions deſtroyed, without daring to reſiſt their invader; by lighting fires, ſtriking drums, and raiſing a cry, they generally frighten it back to its favourite element. Never attacks boats as they go up or down the ſtream; but ſhould they inadvertently ſtrike againſt or diſturb it, there is danger of its ſending them to the bottom. "I have ſeen," ſays a mariner, "one of theſe animals open its jaws, and "ſeizing a boat between his teeth, at once bite and ſink it to the bot-"tom. I have ſeen it upon another occaſion, place itſelf under one of "our boats, and riſing under it, overſet it with ſix men which were in "it; who, however, happily received no other injury."

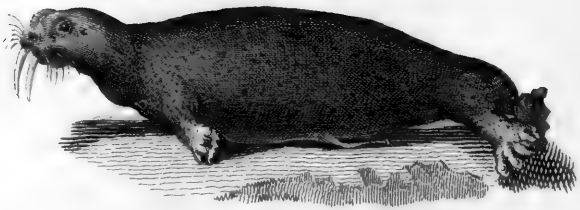
If this animal be attacked too powerfully at land, it returns to the river, where it enters head foremoſt, and after a ſhort time riſes to the ſurface, loudly bellowing. Though the negroes will attack the ſhark, or the crocodile in their natural element, and deſtroy them, they decline to engage the hippopotamus.

The hippopotamos lives on fiſh, vegetables, and probably fleſh, when he can get it. The female comes on land to bring forth, it is ſuppoſed one at a time. Theſe animals are then particularly timorous, and the inſtant the parent hears the ſlighteſt noiſe, it daſhes into the ſtream, and the young one follows with equal alacrity. The young are ſaid to be excellent eating.

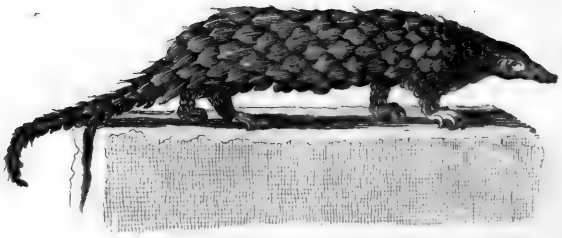
THE TAPIIR.

THE Tapiir may be conſidered as the hippopotamus of the New Continent, but degraded both as to ſize and ferocity; bears ſome diſtant reſemblance in form to a mule; has a long ſnout, which it lengthens or contracts at pleaſure. Ears ſmall, long, and pendent; neck and tail ſhort; claws ſtrong and firm, four on each foot; ſkin thick, covered with brown hair. The natives made ſhields of it, which could not be pierced by an arrow. Chiefly reſides in water, but feeds entirely on vegetables in the paſtures by the river-ſide. Is very timorous; the inſtant it hears the leaſt noiſe, plunges into the ſtream. Are greatly ſought after by the natives; their fleſh is conſidered as a delicacy, and thought by ſome not inferior to beef.

SCALY



The Morse.



The Pangolin

SCALY AND SHELLY QUADRUPEDS.

THE PANGOLIN.

HAS been injudiciouſly called the Scaly Lizard, but it reſembles the lizard only in general form, and in being covered with ſcales. The lizard may be conſidered as a reptile, produced from an egg; the pangolin is a quadruped brought forth alive and perfectly formed. The lizard is all over covered with the marks of ſcales; the pangolin has ſcales neither on the throat, the breaſt, or the belly. The ſcales of the Lizard ſeem ſtuck upon the body even cloſer than thoſe of fiſhes; the ſcales of the pangolin are only fixed at one end, and capable of being erected, like the quills of the porcupine, at pleaſure. The lizard is a defenceleſs creature; the pangolin can roll itſelf into a ball, like the hedge-hog, and preſent the points of its ſcales to the enemy, which effectually defend it.

It is about three or four feet long, the tail as much more; has a ſmall head, very long noſe, ſhort thick neck, long body, legs very ſhort, tail extremely long, thick at the baſe, and terminating in a point; has no teeth, five toes on each foot, with long white claws; is chiefly diſtinguiſhed by its ſcaly covering, which defends all parts, except the under part of the head and neck, under the ſhoulders, the breaſt, the belly, and the inner ſide of the legs; all which are covered with a ſmooth ſoft ſkin, without hair. Between the ſhells, at the interſtices, are hairs like briſtles, brown at the extremity, and yellow toward the root. The ſcales are of different ſizes and forms, ſtuck on the body ſomewhat like the leaves of an artichoak. The largeſt are, near the tail (which is alſo covered with them), three inches broad, two inches long, thick in the middle, ſharp at the edges, and terminated in a roundiſh point; extremely hard like horn; convex above, a little concave within; one edge ſticks in the ſkin, the other laps over that immediately behind it, of a duſky brown colour, and when the animal has acquired its full growth, ſo hard, as to turn a muſquet-ball.

The inſtant it perceives danger, it rolls itſelf up like the hedge-hog, and preſents to the aſſailant only the cutting edges of its ſcales. Its long tail encreaſes its ſecurity, being lapped round the body, and defended with ſhells more cutting than any others. Theſe ſhells, ſo large, ſo thick, ſo pointed, repel every aſſault: the tiger, the panther, the hyæna, vainly attempt it by treading on, or rolling it about. The Negroes

back, ſides, rump, and the tail to the very point; but not the throat, breaſt or belly, which are covered with a white ſoft ſkin, yet offer rudiments of ſhells, even in their ſofteſt parts. Complete oſſification takes place only on parts of leaſt friction, and moſt expoſed. By means of the diviſions in its ſhell, the animal has a motion in its back. The bands are various in number and ſize; generally, two large pieces cover, one the ſhoulders, the other the rump. Between theſe, the bands lap over each other. Beſides their opening croſs-ways, they alſo open along the back. They are differently coloured in different kinds, but uſually are a dirty grey. The ſhell itſelf is covered with a ſoftiſh ſkin, ſmooth and tranſparent.

The armadillo has the ſame method of protecting itſelf as the hedge-hog or the pangolin. When attacked, it withdraws its head under its ſhells, tucks its feet under its belly, while the tail ſerves as a ſtrengthening band: thus it becomes like a ball, flattiſh on each ſide. In this ſituation it is toſſed about by other quadrupeds, and little reſembles a creature endowed with life. The Indians, by laying it cloſe to the fire, ſoon oblige the poor animal to unfold itſelf.

Though native of the warmeſt parts of America, yet it bears our climate. Their motion ſeems to be a ſwift walk, they can neither run, leap, nor climb trees. Their reſource, when purſued, is to make toward their hole as faſt as they can; or, to make a new one. For this they require but a very few moments advantage, having four claws on each foot extremely large, ſtrong, and crooked. If caught by the tail when making their way into the earth, by their reſiſtance they leave their tail in the hand of their purſurer. The fleſh of the ſmaller kinds is ſaid to be delicate eating. If the armadillo be near a precipice, it often eſcapes by rolling itſelf up, and tumbling from rock to rock. They are ſometimes taken in ſnares laid for them by the ſides of rivers and low moiſt places, which they particularly frequent. Their burrows are very deep, and they ſeldom ſtir out but at night, and never far from their retreats.

They moſtly root the ground, like a hog, in ſearch of roots. They eat alſo melons, vegetables, and fleſh, when they can get it. They frequent watery places, were they eat worms, ſmall fiſh, and water inſects, and are frequently found in the ſame hole with the rattle-ſnake.

The firſt of this kind, has three bands between the two large pieces that cover the back, is called the Tatu Apara. The tail is ſhorteſt in this kind, being about two inches long, while the whole ſhell is one foot

foot long and eight inches broad. (2) The Tatou of Ray, or the Encoubert of Buffon, has ſix bands acroſs the back; is about the ſize of a pig of a month old, has a ſmall long head and a very long tail. (3) The Tatuette, with eight bands, much ſmaller; tail longer, and legs ſhorter. Its body about ten inches long, the tail ſeven. (4) The pig-headed Armadillo, with nine bands, two foot long from noſe to tail. (5) The Kabaſſou, or Cataphractus, with twelve bands, often found above three feet long, is never eaten. (6) The weaſel-headed Armadillo, with eighteen bands, a large piece before, and nothing but bands backward, above a foot long; tail five inches. The Kabaſſou and the Encoubert are the largeſt; the reſt are of a much ſmaller kind.

In the large kinds, the ſhell is much more ſolid than in the others, and their fleſh much harder. Theſe generally reſide in dry upland grounds, but the ſmall ſpecies in moiſt places. When rolled into a ball, thoſe whoſe bands are feweſt are leaſt capable of covering themſelves up completely. The Tatu Apara, when rolled up, preſents two great interſtices between its bands, by which it is eaſily vulnerable.

THE ELEPHANT.

THE elephant, at firſt view, preſents an enormous maſs of fleſh covered with a callous hide, without hair; legs ſcarcely formed for motion; little eyes, large ears and long trunk; and an air of extreme ſtupidity which ſubſides when we come to examine its hiſtory. But theſe favourable appearances encreaſe our ſurpriſe when we conſider the various advantages it derives from ſo clumſy a conformation, and the admirable ſagacity connected with it.

The elephant is from ſeven to fifteen feet high. The forehead high and riſing, ears very large and dependant, eyes extremely ſmall, the trunk long, body round and full, back riſing in an arch, the whole figure ſhort in proportion to its height. The feet are round at bottom; on each foot are five flat horny riſings, which ſeem to be the extremities of toes. The hide not hairy. At the end of the tail is a tuft of hair, a foot and a half long. The female is leſs than the male, and the teats between the fore legs.

The

The ſtrongeſt and largeſt of quadrupeds; yet, neither fierce nor formidable. Mild, peaceful, and brave, it never abuſes its power, and only exerts its force for its own protection. Is a ſocial creature: the oldeſt conduct the band; the young, the weak, and ſickly, fall into the centre; the females carry their young, and keep them from falling by means of their trunks. Wherever they march, the foreſts ſeem to fall before them; they bear down the branches upon which they feed, and, if they enter an incloſure, quickly deſtroy the labours of the huſbandman.

They delight to live along the ſides of rivers, in the deepeſt vales, in the moſt ſhady foreſts. They cannot live far from water, and always diſturb it before they drink. Often fill their trunk, either to cool it, or to divert themſelves by ſpurting it out like a fountain. Are equally diſtreſſed by extremes of heat and cold.

Their food is vegetable.

The elephant is remarkable for its hearing. Appears delighted with muſic, readily learns to beat time, to move in meaſure, and even to join its voice to the ſound of the drum and the trumpet.

Its ſenſe of ſmelling is exquiſite, pleaſed with the ſame odours that delight mankind. Gathers flowers with great pleaſure, picks them up one by one, unites them into a noſegay, and ſeems charmed with the perfume. The orange flower ſeems to be particularly grateful to it.

In the ſenſe of touching, it excels all the brute creation, and perhaps even man. This ſenſe lies wholly in the trunk, which is, properly ſpeaking, only the ſnout lengthened out, hollow, ending in two openings, or noſtrils. An elephant of fourteen feet high has the trunk about eight feet long, and five and an half in circumference at the mouth, where it is thickeſt: a partition runs through it. Is capable of being lengthened or ſhortened, bent or ſtraightened, pliant, yet ſtrong. To aid its graſp, are ſeveral little eminences, like a caterpillar's feet, on the underſide, which probably contribute to the ſenſibility of its touch. Through this trunk the animal breathes, drinks, and ſmells: at the very point of it, juſt above the noſtrils, is an extenſion of ſkin, about five inches long, in the form of a finger. By this, the elephant can take a pin from the ground, untie the knots of a rope, unlock a door, and even write. By ſucking up its breath through the extremity of the trunk, it lifts and ſuſtains a weight.

The neck is ſo ſhort that it can ſcarce turn its head. The legs bend not without difficulty. While the elephant is young, it bends the legs to lie down; when old, or ſickly, this is not performed without aſſiſtance.

The ſole of the foot is furniſhed with a ſkin as thick and hard as horn, which completely covers the under part of the foot. Its two enormous tuſks are unſerviceable for chewing, and only weapons of defence. Theſe, as the animal grows old, become ſo heavy, that it is ſometimes obliged to make holes in the walls of its ſtall to eaſe itſelf of the fatigue of their ſupport. They proceed from the upper jaw, and are ſometimes ſix feet long.

The elephant is only native of Africa and Aſia: there are none in the northern parts of Africa at preſent. In Africa, the largeſt do not exceed ten feet high; in Aſia they are found from ten to fifteen. The uſual colour of the elephant is a duſky black, but ſome are ſaid to be white; and theſe are ineſtimable. The elephant never breeds in a ſtate of ſervitude.

To take them wild, a ſpot of ground is fixed on, which is ſurrounded with a ſtrong palliſade, made of the thickeſt and ſtrongeſt trees, and ſtrengthened by croſs bars. Poſts are fixed at ſuch diſtances, that a man can eaſily paſs between; only one great paſſage is left open, which ſhuts behind when the beaſt is entered. A female elephant is conducted into the heart of the foreſt, where it is obliged by its keeper to cry out for the male, who readily anſwers and haſtens to join her: the keeper obliges her to retreat, repeating the cry, till ſhe leads the animal into the enclo-ſure, which grows narrower all the way, till he finds himſelf completely ſhut up. After a day and a night, its indignation ſubſides. In a fort-night it is completely tamed. The elephant, when tamed, becomes gentle and obedient; conceives an attachment for its attendant, careſſes, obeys him, and frequently takes ſuch an affection to its keeper, that it will obey no other. Receives his orders with attention, executes them with prudence, eagerly, yet without precipitation. Kneels down to receive its rider. Seems to take a pleaſure in the finery of its trappings. Can carry on its back three or four thouſand weight; on its tuſks alone can ſupport near a thouſand. Its ordinary pace is as faſt as a horſe can eaſily trot; when puſhed, it can move as ſwiftly as a horſe at full gallop. Can travel with eaſe fifty or ſixty miles a day.

THE

THE RHINOCEROS.

THE rhinoceros is uſually twelve feet, from the noſe to the tail; ſix to ſeven feet high; the circumference of its body is nearly equal to its length. Has a horn, growing from the ſnout, ſometimes three feet and an half long; without this, that part would reſemble the head of a hog; the upper lip is much longer in proportion, ends in a point, is very pliable, ſerves to collect its food, and deliver it into the mouth: ears large, erect, and pointed; eyes ſmall and piercing; ſkin naked, rough, knotty, and lying upon the body in folds; of a dirty brown colour; ſo thick as to turn the edge of a ſcymiter, and to reſiſt a muſquet ball: the belly hangs low; the legs are ſhort, ſtrong and thick, and the hoofs divided into three parts, each pointing forward.

Native of Aſia and Africa, and found in thoſe extenſive foreſts frequented by the elephant and the lion. Subſiſts entirely on vegetable food; is peaceful and harmleſs: though it never provokes the combat, diſdains to fly; and, every way fitted for war, reſts content in ſecurity. Is particularly fond of the prickly branches of trees, and feeds on ſuch thorny ſhrubs as would be dangerous to other animals, either to gather or to ſwallow. Is ſometimes taken in pit-falls, covered with green branches, laid in paths which the rhinoceros makes in going from the foreſt to the river ſide.

Some found in Africa have a double horn, one growing above the other. This weapon is one of the ſtrongeſt, and moſt dangerous, that nature furniſhes to any animal: is entirely ſolid, formed of the hardeſt bony ſubſtance, growing from the upper maxillary bone, by ſo ſtrong an apophyſe, as ſeemingly to make but one with it.

GIRAFFE, OR CAMELOPARDALIS.

ITS head ſomewhat reſembles a deer, with two round horns (which perhaps it ſheds), a foot long, blunt, thick, and tufted with hair; its neck reſembles a horſe; its legs and feet, a deer; fore legs much longer than the hinder. Its tail reſembles a horſe, but has leſs hair.

Its hoofs are extremely black, obtuſe, and ſpread. A kind of mane runs all down its ſpine; inclining backwards to half way of the back, then inclining forwards, and near the tail inclining backwards again. This mane is long on the neck, ſhort toward the tail. Its eyes have eye-laſhes of ſtiff hair; ſome ſtiff hairs alſo round the mouth. A bony kind of tubercle makes a ſort of third horn on the forehead. Ears large. Its teeth, reſembling thoſe of deer, are made entirely for vegetable paſture. It is beautifully ſpeckled with brown or black ſpots, on a light browniſh or dirty white ground: the females lighter than the males. Timorous and harmleſs; lives entirely on the leaves of trees; always carries its head very high. Kneels down to drink. Its motion is a kind of pace, the two front or two hind legs moving together; runs awkwardly, and badly. Often lies down on its belly. Was known to the ancients, but rarely ſeen in Europe. Pompey exhibited, at one time, no leſs than ten. Inhabits the internal regions of Africa.

The dimenſions of a young one, brought from the Cape of Good Hope, were as follows: Length of the head, one foot eight inches; the fore leg, from the ground to the top of the ſhoulder, ten feet; from thence, to the top of the head, ſeven, making together ſeventeen feet; height of the hind leg, eight feet five inches: from the top of the ſhoulder, to the inſertion of the tail, ſeven feet. Sometimes are twenty-five feet from noſe to tail.

THE BEAR.

OF the bear, are three different kinds; the brown bear of the Alps, the black bear of North America, which is ſmaller, and the great Greenland or white bear. Of the ſame habitudes, carnivorous, treacherous and cruel.

The brown bear is properly an inhabitant of the temperate climates; the black finds ſubſiſtence in the northern regions of Europe and America: the great white bear inhabits the moſt icy climates. The brown bear, ſavage and ſolitary, takes refuge in the moſt dangerous precipices of uninhabited mountains; in the gloom of the foreſt, in ſome cavern hollowed by time, or in the hollow of ſome old enormous tree. There, alone, it paſſes ſome months in winter without proviſions, and without ſtirring abroad;

abroad; not entirely deprived of ſenſation. Seems to ſubſiſt on the exuberance of its former fat, and only feels the calls of appetite, when what it had acquired in ſummer is waſted. When the bear retires to its den for the winter, it is extremely fat; but at the end of forty or fifty days, when it comes forth to ſeek freſh nouriſhment, it ſeems to have ſlept away all its fleſh. Couples in autumn; time of geſtation unknown: the female takes great care to provide a proper retreat for her young, in the hollow of a rock; where ſhe provides a bed of hay. Brings forth in winter; the young begin to follow her in ſpring.

The voice of the bear is a kind of growl, interrupted with rage, often capricious. Capable of ſome degree of inſtruction: can dance in awkward meaſures on its hind feet, to the voice or to the inſtrument of its leader; and is often the beſt performer of the two. When come to maturity, can never be tamed. The leaſt dangerous method of taking it is by intoxicating it, by throwing brandy upon honey, of which it is very fond. In Canada, they are taken by ſetting fire to their retreats, which are often thirty feet from the ground. The old one generally firſt iſſues from her den, and is ſhot by the hunters. The young ones, as they deſcend, are caught in a nooſe. Their hams, and eſpecially their paws, are ſaid to be a great delicacy.

The white Greenland bear, though it preſerves the general external form of its ſouthern kindred, grows to above three times their ſize. The brown bear is ſeldom above ſix feet long; the white bear often from twelve to thirteen. The brown bear is made ſtrong and ſturdy; the Greenland bear, though covered with very long hair, is ſlender; the head, neck, and body, more inclining to the ſhape of the greyhound. Seems the only animal, that in the coldeſt climate grows larger than thoſe of its kind in the temperate zones. Come down to view our ſailors on their ſhores with an awkward curioſity; approach ſlowly, as if undetermined. When ſhot at, or wounded, endeavour to fly; finding that impracticable, make a fierce and deſperate reſiſtance.

The number of theſe animals about the north pole, is amazing. They are not only ſeen at land, but often on ice floats, ſeveral leagues at ſea; and are tranſported in this manner to the very ſhores of Iceland, where the natives are in arms to receive them. It often happens, when a Greenlander and his wife are out at ſea, by coming too near an ice-float, a white bear unexpectedly jumps into their boat, and, if he does not overſet it, ſits calmly where he firſt came down, and like a paſſenger ſuffers himſelf to be rowed along.

Lives

Lives chiefly on fiſh, ſeals, and dead whales; ſeldom removes far from the ſhore. When forced by hunger, ventures into the deep, ſwims after ſeals, and devours whatever it can ſeize; is but a bad ſwimmer, and is often hunted by boats, till fatigued, and at laſt deſtroyed.

THE RACOON.

THE racoon, which ſome have called the Jamaica rat, is about the ſize of a ſmall badger; body ſhort and bulky; fur fine, long, and thick, blackiſh at the ſurface, grey toward the bottom; noſe rather ſhorter, and more pointed than that of a fox; eyes large and yellow; teeth reſembling thoſe of a dog; tail thick, but tapering, marked with rings of black, at leaſt as long as the body; forefeet much ſhorter than the hinder; both armed with five ſharp claws, with which, and his teeth, the animal makes a vigorous reſiſtance. Like the ſquirrel, uſes its paws to hold its food (differs from the monkey kind, which uſe but one hand, whereas the racoon and the ſquirrel uſe both). Though ſhort and bulky, yet very active; by its pointed claws it climbs trees with great facility; runs up the trunk with the ſame ſwiftneſs that it moves on the plain; and ſports among the extreme branches with great agility; moves forward chiefly by bounding, and though it proceeds obliquely, has ſpeed enough frequently to eſcape its purſuers.

Native of the ſouthern parts of America, found in noxious abundance, in Jamaica, on the mountains; often deſcends to feed on the ſugar-cane. The planters conſider theſe animals as one of their greateſt miſeries; have contrived various methods of deſtroying them, yet they propagate in ſuch numbers, that neither traps nor fire-arms can thin them; ſo that a ſwarm of theſe famiſhed creatures do more injury in one night, than the labours of a month can repair.

When tame, is harmleſs and amuſing; capable of being inſtructed in various tricks. Is playful and cleanly: eats of every thing given it; if left to itſelf, no cat can be a better provider; examines every corner, eats fleſh, boiled or raw, eggs, fruits, corn, inſects, ſnails, worms and beetles; has a particular fondneſs for ſweets. Will eat its proviſions dry,

The Ant Bear,

dry, but will by choice dip them in water, if it happens to be in the way. Has a peculiarity in drinking, as well by lapping like the dog, as by ſucking like the horſe.

THE COATIMONDI.

ITS ſnout ſomewhat reſembles that of the hog, but is greatly elongated; the neck and the body are long, the fur ſhort, the eyes ſmall, the upper jaw an inch longer than the lower, and the ſnout, which is moveable in every diviſion, turning up at the end. Sets up on the hind legs, and in this poſition, with both paws, carries the food to its mouth. Length from noſe to tail eighteen inches.

Is very apt to eat its own tail, which is ſometimes longer than its body (ſome of the monkey kinds do the ſame, and ſeem to feel no pain in wounding a part of the body ſo remote from the centre of circulation). Of playful qualities, and indiſcriminate appetite; at liberty will purſue poultry, and deſtroy every living thing it can conquer; though playful with its keeper, yet obſtinate againſt receiving inſtruction: neither threats nor careſſes can induce it to practiſe any arts to which it is not naturally inclined. When it ſleeps, rolls itſelf up in a lump, and ſo continues often fourteen or fifteen hours together. Inhabits Brazil.

THE ANT-EATERS

HAVE been claſſed, by Mr. Buffon, into the larger tamandua (our ant-bear), the ſmaller tamandua, and the ant-eater. The ant-bear is four feet long, from the ſnout to the tail; legs ſhort, armed with four ſtrong claws; tail long and tufted; the animal often throws it on its back like the ſquirrel. The tamandua is eighteen inches long, the tail without hair, trails on the ground as the animal moves. The ant-eater is not above ſeven inches from the ſnout to the tail. The two former are of a brown duſky colour, this a beautiful reddiſh, mixed with yellow.

Though they differ in figure, they reſemble in ſlenderneſs of ſnout, and amazing length of tongue. The two laſt have prehenſile tails.

The ant-bear is neither numerous, nor often ſeen; its retreats are in the moſt barren parts of South America only; reſides chiefly in woods, hides itſelf under fallen leaves; lives entirely upon ants and inſects, which are found in abundance, and often build hills, many feet high. Near an ant-hill, it creeps ſlowly on its belly, cautiouſly concealing itſelf, till within a proper diſtance; there lying cloſe, it thruſts forth its round red tongue (often two feet long) acroſs the path of theſe buſy inſects, and lets it lie motionleſs. The ants ſwarm upon it; but where they touch they ſtick; held by a ſlimy fluid, which covers the tongue. Though without teeth, fights with its claws very obſtinately againſt the dog, and even the jaguar: throws itſelf on its back, faſtens on its enemy with all its claws, ſticks with great perſeverance, and even, after killing its invader, remains faſtened upon him with vindictive deſperation.

THE SLOTH.

OF the ſloth, are two kinds, diſtinguiſhed by their claws; the Unan with only two claws on each foot, and without a tail; the Ai, having a tail, and three claws on each foot. The unan has the ſnout longer, the ears more apparent, and the fur very different; differs alſo in the number of its ribs, having forty-ſix, while the Ai has but twenty-eight. Nevertheleſs theſe two animals ſtrongly reſemble each other in their general outlines and manners.

The fur of the Ai is coarſe and ſtaring, ſomewhat reſembling dried graſs; tail very ſhort, mouth large, eye dull and heavy, feet with three claws, the feet ſhort, but longer than its legs; proceeding from the body obliquely, ſo that the ſole of the foot ſeldom touches the ground. When the animal is compelled to ſtep forward, it ſcrapes the back of its nails along the ſurface, and wheeling its leg circularly about, ſtill touching the ground, at length places its foot: limb after limb is moved with equal difficulty, not above three feet in an hour.

Lives entirely on vegetable food, the leaves, fruit, and flowers of trees. Has four ſtomachs; and generally ſtrips a tree of its verdure in leſs

The Sloth

The Ant-eater.

leſs than a fortnight; but unwilling to quit, while any thing alive remains, it devours the bark, and ſhortly kills the tree on which it fed. Utterly unable to deſcend, it is obliged to drop to the ground like a ſhapeleſs heavy maſs, then journeys to ſome neighbouring tree. Often takes a week in crawling to a tree not fifty yards diſtant. Every ſtep it emits a moſt plaintive, melancholy cry, accompanied with tears; which excites diſguſt, mixed with pity. This ſeems its chief defence. When at length it reaches its deſtined tree, mounts it with much greater eaſe than when moving on the plain: devours with famiſhed appetite, and, as before, not ſparing the very ſource of its ſupplies. Has but one common vent. Lives ſome time after its nobler parts are wounded, or taken away.

THE GERBOA

HAS four feet, but, in running or reſting, uſes only the hinder, yet is one of the ſwifteſt creatures in the world.

Is not above the ſize of a large rat. Its head not totally unlike a rabbit, its teeth reſemble thoſe of the rat kind; two cutting teeth in each jaw; a very long tail, tufted: head, back and ſides covered with large aſh-coloured ſoft hair; breaſt and belly whitiſh, the fore-legs not an inch long, four claws and a thumb on each; the hinder legs two inches and a quarter, exactly reſembling thoſe of a bird, having but three toes, the middle longeſt.

Found in Egypt, Barbary, Paleſtine, and the deſerts; its fore-paws graſp its food, and in ſome meaſure perform the office of hands. Jump ſix or eight feet at a bound; extremely ſwift. Are lively, harmleſs, live on vegetables, burrow like rabbits. Are more expert diggers than the rabbit; when purſued, if they cannot eſcape by their ſwiftneſs, they try to make a hole inſtantly in the ground. Is provident, and lays up for winter. Cuts graſs in heaps of a foot ſquare, which, when dried, carries into its burrow for food or warmth.

The following animal has much external reſemblance to the Gerboa: what is its true ſtation, muſt be decided by future obſervations; our lateſt information is as follows.

THE

THE KANGAROO.

Extract from Captain Tench's "Account of Botany-Bay."

"OF the natural hiſtory of the kangaroo we are ſtill very ignorant. We may, however, venture to pronounce this animal a new ſpecies of opoſſum, the female being furniſhed with a bag, in which the young is contained; and in which the teats are found. Theſe laſt are only two in number; a ſtrong preſumptive proof, had we no other evidence, that the kangaroo brings forth rarely more than one at a birth. But this is ſettled beyond a doubt, from more than a dozen females having been killed, which had invariably but one formed in the pouch. Notwithſtanding this, the animal may be looked on as prolific, from the early age it begins to breed at; kangaroos with young having been taken of not more than thirty pounds weight; and there is room to believe that, when at their utmoſt growth, they weigh not leſs than one hundred and fifty pounds. A male of one hundred and thirty pounds weight has been killed, whoſe dimenſions were as follow: Extreme length ſeven feet three inches; the tail three feet four inches and a half; the hinder legs three feet two inches; the fore paws one foot ſeven inches and a half; the circumference of the tail at the root one foot five inches. After this, perhaps, I ſhall hardly be credited when I affirm, that the kangaroo, on being brought forth, is not larger than an Engliſh mouſe. It is, however, in my power to ſpeak poſitively on this head, as I have ſeen more than one inſtance of it.

In running, this animal confines himſelf entirely to his hinder legs, which are poſſeſſed with an extraordinary muſcular power. Their ſpeed is very great, though not in general quite equal to that of a greyhound; but when the greyhounds are ſo fortunate as to ſeize them, they are incapable of retaining their hold, from the amazing ſtruggles of the animal. The bound of the kangaroo, when not hard preſſed, has been meaſured, and found to exceed twenty feet.

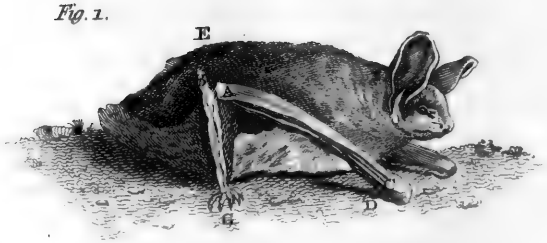
When young, the kangaroo eats tender and well-flavoured, taſting like veal; but the old ones are more tough and ſtringy than bull-beef. They are not carnivorous, and ſubſiſt altogether on particular flowers and graſs. Their bleat is mournful, and very different from that of any other animal; it is, however, ſeldom heard but in the young ones."

The head, neck, and ſhoulders are very ſmall in proportion to the body,

Fig. 2.

The Bat

Fig. 1.



body, which, though tapering upwards, enlarges below. Tail nearly as long as the body, tapering toward the end, covered with a ſhort fur, except the head and ears, which bear a ſlight reſemblance to the hare. Probably the difference of ſize in this creature, indicates different kinds.

THE BAT.

THE bat ſomewhat reſembles a bird, in its power of ſuſtaining itſelf in the air; though its motion is very awkward and ſtruggling—but, it brings forth its young alive, ſuckles them, has teeth; and its lungs, its inteſtines, and its ſkeleton are like thoſe of quadrupeds.

The bat, moſt common in England, is about the ſize of a mouſe; or nearly two inches and an half long. Its membranes, called wings, are properly an extenſion of the ſkin all round the body (not the head), which, in flying, is ſtretched, by the four interior toes of the fore feet, which are enormouſly long. The firſt toe is looſe, and ſerves as a heel when the bat walks, or as a hook, when it would adhere to any thing. The hind feet are diſengaged from the ſurrounding ſkin, and divided into five toes, ſomewhat reſembling thoſe of a mouſe. The ſkin, by which it flies, is of a duſky colour. The body is covered with a ſhort fur, of a mouſe-colour, tinged with red. The eyes are very ſmall; the ears like thoſe of a mouſe.

It appears early in ſummer, flies in the duſk of evening. Frequents the ſides of woods, glades, and ſhady walks; often ſkims along the ſurface of water. Purſues gnats, moths, and nocturnal inſects; and will not refuſe meat. Its flight is laborious, irregular; and, if interrupted, it cannot readily acquire a ſecond elevation. Appears only in pleaſant evenings; flies in purſuit with its mouth open. At other times abides in its retreat, the chink of a ruined building, or the hollow of a tree. Thus, even in ſummer, ſleeps the greateſt part of its time, never venturing out by day-light, nor in rainy weather. Its ſhort life is further abridged by a torpid ſtate, during winter. Often hangs by its hooked claws to the roofs of caves, regardleſs of ſurrounding damps. Such as ſeek not deep retreats of uniform temperature, often periſh by the weather becoming ſo mild in winter as to warm them prematurely into life, and to allure them from their holes in queſt of food, when they exhauſt themſelves in purſuit of inſects which are not to be found.

The

The bat couples and brings forth in ſummer, from two to five. The female has two nipples, forward on the breaſt. She makes no neſt for her young, but is content with the firſt hole ſhe meets, where ſticking herſelf by her hooks, ſhe permits her young to hang at the nipple, for the firſt or ſecond day. When ſhe finds a neceſſity of ſtirring abroad, ſhe ſticks her little ones to the wall as ſhe before hung herſelf; where they cling till her return.

The bat has ſtrong pectoral muſcles to aſſiſt its flight, and weak legs, (wherein it agrees with birds). And is never ſeen to walk, or rather to puſh itſelf forward with its hind legs, but in extreme neceſſity. The toes of the fore legs, or, if we may uſe the expreſſion, its very long fingers, extend the web-like membrane between them; which being extremely thin, ſerves to lift the little body into the air: where, by unceaſing percuſſion, the animal continues, and directs its flight; but is fatigued in leſs than an hour.

Among its varieties, are the long-eared bat, which is very ſmall; the horſe-ſhoe bat, with an odd protuberance round its upper lip, in form of a horſe-ſhoe; the rhinoceros bat, with a horn growing from the noſe.

But the race of bats in the Eaſt and Weſt-Indies, are truly formidable; and in ſuch numbers, that, when they fly, they obſcure the ſetting ſun.

The largeſt we certainly know of, is the rouſette, or great bat of Madagaſcar; near four feet broad, wings extended; one foot long, from the noſe to the tail. Is fox-coloured; its head and noſe alſo reſemble that animal; and ſome have called it the Flying-fox: it differs in the number of its teeth; and in having a claw on the fore foot, which is wanting in ours. Inhabits Madagaſcar, the coaſts of Africa and Malabar. When they repoſe, they ſtick to the tops of the talleſt trees, with their heads downward. When in motion, like clouds, they darken the air, day and night, deſtroying the ripe fruits of the country, and ſometimes ſettling on animals, or man: they devour fruits, fleſh, inſects, and drink the juice of the palm tree: their horrid din is heard at night in the foreſts, at two miles diſtance; at the approach of day, they retire. Some have obſerved, that the ancients ſeem to have taken their harpies from theſe fierce and voracious creatures, as they agree to many parts of the deſcription, being equally deformed, greedy, uncleanly, and cruel.

But ſtill more miſchievous is the American Vampyre; leſs than the former; more deformed, and more numerous. Has a horn like the rhinoceros bat, and extremely long ears. Theſe enter towns and cities, and, after ſun-ſet, cover the ſtreets like a canopy. "They are," ſays Ulloa,

Ulloa, "the moſt expert blood-letters in the world." The inhabitants of thoſe warm latitudes being obliged, by the exceſſive heats, to leave open the doors and windows of their chambers, the vampyres enter, and if any part of the body be expoſed, they faſten on it, and ſuck the blood; often the perſon dies under the operation. "I have been aſſured," continues he, "by perſons of the ſtricteſt veracity, that ſuch an accident has happened to them; and that, had they not providentially awaked, their ſleep would have been their paſſage into eternity; having loſt ſo large a quantity of blood as hardly to find ſtrength to bind up the orifice, The reaſon why the puncture is not felt is, beſides the great precaution with which it is made, the gentle, refreſhing agitation of the bat's wings, which contribute to encreaſe ſleep, and ſoften the pain." Ulloa ſuppoſes, the puncture is made by a ſingle tooth. Mr. Buffon ſuppoſes the wound is inflicted by the tongue. Others think that, without inflicting any wound, by continual ſuction, it enlarges the pores of the ſkin, till the blood paſſes. But all agree as to the fact, though they diſagree as to the manner.

Theſe animals are a great peſt of South America; and often prevent the peopling many parts of that continent: having deſtroyed at Barja, and ſeveral other places, the cattle brought there by the miſſionaries to form a ſettlement.

SURVEYS OF NATURE.

PART THE FOURTH.

WE come now to a large diviſion of creatures, entirely diſtinct from what have hitherto engaged our attention. It is true, we have ſeen quadrupeds flying, or rather leaping (as the ſquirrel), and labouring a progreſſive motion (as the bat), but far from being able to endure, and continue this exerciſe, they ſoon become enfeebled: ſtill leſs have they power to attain great elevation, or to float on the atmoſphere as if at reſt. Their flight was a deviation from the general nature of quadrupeds, wherein they approached to ſomewhat of a bird; as the incapacity of ſome birds for flight, deviates alſo from the general nature of their kind, and ſomewhat approaches a quadruped: nevertheleſs, the great diſtinction between theſe kinds of creatures is, the capacity of one to riſe in air, while the other is confined to reſidence on the earth.

To this quality of riſing contribute, (1) Their external ſhape; (2) Their clothing of feathers; (3) The great ſtrength of their pectoral muſcles; (4) Their capacity of inhaling conſiderable quantities of air: moſt probably connected with a principle whereby they accommodate themſelves to the different degrees of rarity in the air, as they aſcend to conſiderable heights.

The external ſhape of birds, is evidently adapted to pierce through a yielding medium; *ſharp* at firſt—gradually ſwelling—its chief bulk in the middle—and its termination not ſudden, but diminiſhing—yet, by means of the tail, capable of expanſion: the very conſtruction of a ſwift ſailing veſſel!

The capability of expanſion, or retraction, appears to great advantage in the conſtruction of their clothing: is remarkable alſo in their wings and tail, whereby they occupy greater ſpace in the fluid wherein they move, without augmenting their weight. A wing, when folded, is in ſo cloſe union with the creature's body, as to make a part of it; but when expanded, is incomparably beyond the effect of oars on a veſſel: not only is it generally ſpread, but all its parts, not only its joints, but its feathers aſſume a new direction, and as ſo many *radii* from the centre of their inſertion diverge as much as may be, to occupy a greater ſpace; yet never ſo much as to leave vacuities between any two.

Feathers are not merely adapted for flight, by ſtrength combined with lightneſs, by elaſticity, and by form; but, as defenſative, they protect their wearer from injury, and, as clothing, they anſwer every purpoſe of warmth and comfort. They generally are uniform in their poſition, are laid all the ſame way, one over another, regularly, neatly, ſo as to make a perfectly *ſmooth* ſuperficies, whoſe external *evenneſs* may prevent ſettlings of water, &c. while, next the body, a cheriſhing ſoft down forbids the penetration of cold to injure its wearer. To maintain this ſmoothneſs, which, by expoſure to accidents, is liable to be deſtroyed, the bird has a gland ſituated on the rump, furniſhed with an excretory duct; this ſupplies an oil, for the purpoſe of dreſſing the feathers, which the bird communicates to each feather as wanted, by drawing it through his bill, in which he has previouſly gathered a quantity. Water-fowl have this oil in the greateſt abundance, land-fowl have leſs, and thoſe domeſticated very little: Theſe are rarely far from ſhelter; and nature beſtows nothing ſuperfluous or uſeleſs.

A feather

A Feather is an admirable inſtance of artful appointment: its quill ſtrong, but not ſolid; its ſtem ſpungy and flexible, its vane or beard, ſubdivided into many parts, each reſembling a feather; having other parts riſing from them, whoſe hooked terminations keep faſt hold of their neighbours; and by a kind of interweaving (eaſily ſeparable if neceſſary, yet able to reſiſt the impulſes of the air) complete the unitedneſs of the whole. The combination ſeems thus: the hooked offspring from the vanes unite the vanes; the vanes of one feather lying *over* thoſe of another, unite the feathers into compactneſs. In the ſhaft of a feather is the pith, which nouriſhes the ſtem, and its parts. Feathers are generally placed according to their length and ſtrength, ſo that their duty is proportioned to their ability.

The wing is ſituated in birds according to its intent: where it is little uſed, beſide being ſmall, it is leſs accurately placed to poiſe the body, and to receive the whole force of its moving powers, and is uſually *ſquat*; where it is the inſtrument of extenſive excurſion, it is longer, leſs fleſhy, and very carefully fitted. At the extremity, is a kind of finger-like appendage, uſually called a *baſtard-wing*. The beards of wing-feathers are remarkably broad on one ſide, and narrow on the other: the narrow ſide of one lying over the broad ſide of its fellow, contributes to the ſtrength of the whole; by introducing its ſtem to the ſupport of its fellow, where weakeſt.

The manner in which moſt birds riſe is thus: they quit the earth with a bound, in order to have room for flapping the wing; then they ſtrike the body of air beneath the wing with its whole under ſurface; but, to avoid ſtriking the air on the upper ſide with equal violence, the wing is inſtantly contracted; ſo that the creature riſes by the impulſe of this firſt blow, till it ſpreads the wing for a ſecond. For this reaſon, birds chooſe to riſe againſt the wind, becauſe they have a greater body of air on the under than on the upper ſide of the wing. For theſe reaſons alſo large fowls do not riſe eaſily, becauſe they have not ſufficient room at firſt

for the motion of their wings, and becauſe the body of air does not lie ſo directly under the wing as they riſe.

The office of the pectoral muſcles being to move the wings, they are endowed with peculiar ſtrength: the ſtroke of a ſwan's wing would break a man's leg, and ſuch a blow from an eagle has deprived a man of life. Beſide mere ſtrength, they have occaſion alſo for perſeverance: their efforts muſt often be maintained long together; and this in birds of paſſage is remarkable: they poſſeſs not the power of an eagle, but poſſibly they exceed many of that kind in continuance; ſome birds ſeem always flying, and are found hundreds of leagues from ſhore, ever on the wing.

The toes in ſome are webbed, to fit them for the waters; in others ſeparate for their better claſping. Thoſe with long legs have alſo long necks, or how could they gather their food? But thoſe with long necks have not always long legs; we inſtance in ſwans and geeſe.

The bones of birds are extremely light and thin though compact, and the muſcles (except thoſe moving the wings) extremely ſlight. The tail, which is compoſed of quill-feathers, balances the head and neck; directs their flight like a rudder, and greatly aſſiſts in deſcending.

We find by ourſelves, that rapid motion ſpeedily induces difficulty of breathing; yet the principal muſcles uſed in ſuch exerciſe, are not ſeated around the lungs: were our arms exerted with equal violence (of which they are unable) their effects might be greater. To prevent this impeded reſpiration in birds, their lungs (commonly called the ſole) adhere to the ribs and back, and very little dilate or contract. But the branches of the wind-pipe open into them, while theſe open into the cavity of the belly, and convey the air inhaled by breathing into certain receptacles like bladders, running the length of the whole body: ſo that air blown into the wind-pipe will diſtend the animal's body like a bladder; conſequently they have great facility of long and large inſpiration. Sometimes alſo the wind-pipe makes many convolutions within the body of the bird, and is then called the labyrinth; but of what uſe are theſe convolutions is not known.

I ſuſpect

I ſuſpect alſo, that as ſome birds have a vacuity between the fleſh and ſkin, ſo that air blown between ſwells them externally (*i. e.* their ſkin), while their fleſh remains little affected; ſo birds, which riſe to great heights, may ſwell and dilate themſelves when high, more than when low; to counteract the effect of the rarer medium at thoſe heights, againſt which ſtrength of wing is a feeble reſource.

Birds have, properly ſpeaking, but one ſtomach; but different in different kinds. In the rapacious kinds that live on animal food, and in ſome of the fiſh-feeding tribes, the gullet is replete with glandulous bodies, which dilate and moiſten the food as it paſſes; the ſtomach is always large, and generally wrapped round with fat, to increaſe its warmth.

In granivorous birds, the gullet dilates juſt above the breaſt-bone, and forms a pouch or bag, called the crop; this contains ſalivary glands to moiſten its contents. They are very numerous, with longitudinal openings, which emit a whitiſh and viſcous ſubſtance. After a convenient time the food paſſes into the belly, where (inſtead of a ſoft, fat, moiſt ſtomach, as in the rapacious kinds) it is ground between two pair of muſcles, commonly called the gizzard, covered on the inſide with a ridgy coat, almoſt cartilaginous. Theſe ridgy coats, rubbing againſt each other, are capable of bruiſing and attenuating the hardeſt ſubſtances, even iron or ſtones.

Birds are in general very much longer-lived in proportion than quadrupeds: the age of quadrupeds is calculated at about ſeven times the interval between their birth and maturity; that of birds is probably ten or twelve times that interval. Their diſeaſes are few: the moſt remarkable is their moulting. We have ſeen ſomewhat reſembling this among quadrupeds; but in birds it is moſt notorious. We have ſeen the ſtag caſt his horns, the camel his coat, the rabbit his fur; we have ſeen winter aſſimilate to its ſnows the clothing of polar animals, and their varying colours return in ſpring; but in birds, this change is ſo powerful, that they

become hardly recognizable: eſpecially the difference is great between a young bird, and one which has often undergone this operation.

During this ſeaſon, thoſe moſt remarkable for courage become timid, and thoſe of weakly conſtitutions often die. All ceaſe to breed; and their whole nouriſhment is abſorbed by the naſcent plumage, whoſe progreſs ſeems to be as follows,——

A quill or feather, when come to its full ſize, grows harder as it grows older, and receives a kind of perioſteum or ſkin round its ſhaft. In proportion as the quill hardens, its diameter ſhrinks, its nouriſhment decreaſes, and it becomes looſe in its ſocket, till at length it falls. In the mean time, the rudiments of an incipient quill are beginning. The ſkin forms a little bag, which is fed by a ſmall vein and artery, and which daily increaſes till protruded. While one end vegetates into the beard or vane of the feather, that attached to the ſkin is ſoft, and receives a conſtant nouriſhment, which it diffuſes through the whole by the pith. When the quill is full grown, the vein and artery diminiſh, and at length diſappear. The quill thus deprived continues in its ſocket, till after its proper time it ſhrinks, looſens, and quits its place to a ſucceſſor.

We have ſeen quadrupeds dwell in ſubterranean habitations, in dens, in burrows, or among trees; inhabitants of the air may be expected to chooſe a free communication with their peculiar element, they decline therefore *depth* as not to them ſecure; and neſtle in the grove, the foreſt, or the field, on the ſhore, or among rocks, in hopes of concealing their abode from the eye of hungry enmity.

Quadrupeds being viviparous, the male has little opportunity of teſtifying his ſatisfaction till the young appear; but among birds, the male contributes to the advancement of the future progeny; ſometimes by poſitive incubation, ſitting on the eggs in the abſence of the female, ſometimes by his ſong, cheering his conſort, and anticipating his endearments, and ſometimes by catering for her while confined in her important occupation. When the young

young riſe into life, is the ſummit of both their joys, both are tranſported with pleaſure, and elated with pride: at this period, the moſt timid become courageous, the rapacious become unuſually fierce and active: They carry their prey, yet throbbing with life, to the neſt, and early accuſtom their young to ſlaughter. While the young are unfledged, the parents provide them regular ſupplies; and feed each in its turn. When the family is plumed, and capable of flight, they are led forth when the weather is fine, and taught the art of ſubſiſtence; where their food lies, and the method of diſcovering and ſecuring it: they return to the neſt, for a day or two, but when able to ſhift for themſelves, the old ones forſake them, and totally diſclaim all future connexion.

The greateſt number of birds remain in their native diſtricts. The rook, if undiſturbed, never deſires to leave his native grove; the black-bird frequents his accuſtomed hedge; and the red-breaſt, though ſeemingly mild, claims a certain diſtrict, from whence he ſeldom moves, but drives out every one of the ſame ſpecies. Why then do birds of paſſage yearly forſake us, and regularly return? ——Few ſubjects are ſo much involved in darkneſs.

Food is probably one cauſe, yet thoſe which in cages have plenty of food, are equally anxious, as if they were ſtarving: temperature is probably another cauſe, yet thoſe ſheltered and kept warm, are equally reſtleſs. Do they fly from man in countries too well inhabited for their repoſe? Whence have the young this knowledge? However it be, it ſeems a preconcerted undertaking: They aſſociate in ſome open place, ſeveral days before their departure, and, by an odd kind of chattering, ſeem to debate the ſubject. They take flight together, and often in ſuch numbers, that, to mariners at ſea, they ſeem like a cloud that reſts on the horizon. By far the greateſt number make good their intention; but many grow weary, and ſpent by fatigue.

Of the numerous tribes of the duck kind, that frequent our ſhores—we know ſcarce more than five that breed here. The reſt contribute to form that amazing multitude of water-fowl which

annually repair to the dreary lakes and deſarts of Lapland, where they perform the duties of incubation and nutrition in full ſecurity, among lakes, rivers, ſwamps, and mountains, covered with thick and gloomy foreſts. Here the ground remains moiſt and penetrable during the ſummer; here the woodcock, ſnipe, and ſlender billed birds feed at eaſe; while the web-footed birds find food in plenty from infinite ſwarms of inſects. From hence they deſcend at the approach of winter in numbers abſolutely innumerable; and which Linnæus has obſerved for eight whole days and nights to cover the ſurface of the river Calix.

It has been often a ſubject of aſtoniſhment, how theſe creatures ſhould perform ſuch long journeys, ſhould know whither to ſteer, and when to ſet out. It is probable they rather follow the weather than the country; and that they proceed as they continue to find the atmoſphere favourable, of the minuter variations of which they are probably ſpeedily ſenſible and early apprized.

Thus ſome birds by migrating inhabit every part of the earth; in general each climate has its peculiar birds. Thoſe of the temperate zone have little beauty of plumage, but the ſmaller kinds have exquiſite melody of voice. Thoſe of the torrid zone are of bright and vivid colours, but of ſcreaming voices, or are ſilent. The frigid zones boaſt little of either melody or brilliancy, but abound with birds of the aquatic kinds, whoſe clothing is warm not ſhewy, and ſubſtantial not gaudy.

The number of quadrupeds little exceeds two hundred kinds: of theſe, by grouping them together, we have obtained a tolerably diſtinct conception, having given to each that portion of attention which its importance might claim: there is much greater difficulty, in endeavouring to acquire equally determinate knowledge of birds, becauſe (1) their numbers are greater, probably exceeding a thouſand, even omitting many varieties. (2) They are ſpread as well over the waters as the land. (3) Their changes are greater in the courſe of their lives. (4) The difference between the ſexes is ſtronger. (5) The influence of climate is very con-

conſiderable. (6) They ſeem capable of uniting their varieties more than quadrupeds are. (7) With regard to ſome of them, though we can deſcribe their manners while with us; we know little of their procedures while abſent: in ſhort, birds more eaſily eſcape our purſuit than quadrupeds; and conſequently our knowledge is built on more diſtant acquaintance.

Thus circumſtanced, muſt we give up the purſuit of knowledge, or be content with what is attainable? Certainly, theſe obſtacles may excite diligence in the obſerver, and candour in the inſtructed; for evidently much remains obſcure, and equally evidently, what is diſcovered has been the work of time, and the effect of labour, toil, trouble, expence, dexterity, genius, and remark, which though they may err, yet on the whole deſerve praiſe; and though not complete in knowledge, may juſtly aſſume a credit for all that is known.

OF THE

DISTINCTIONS OF BIRDS.

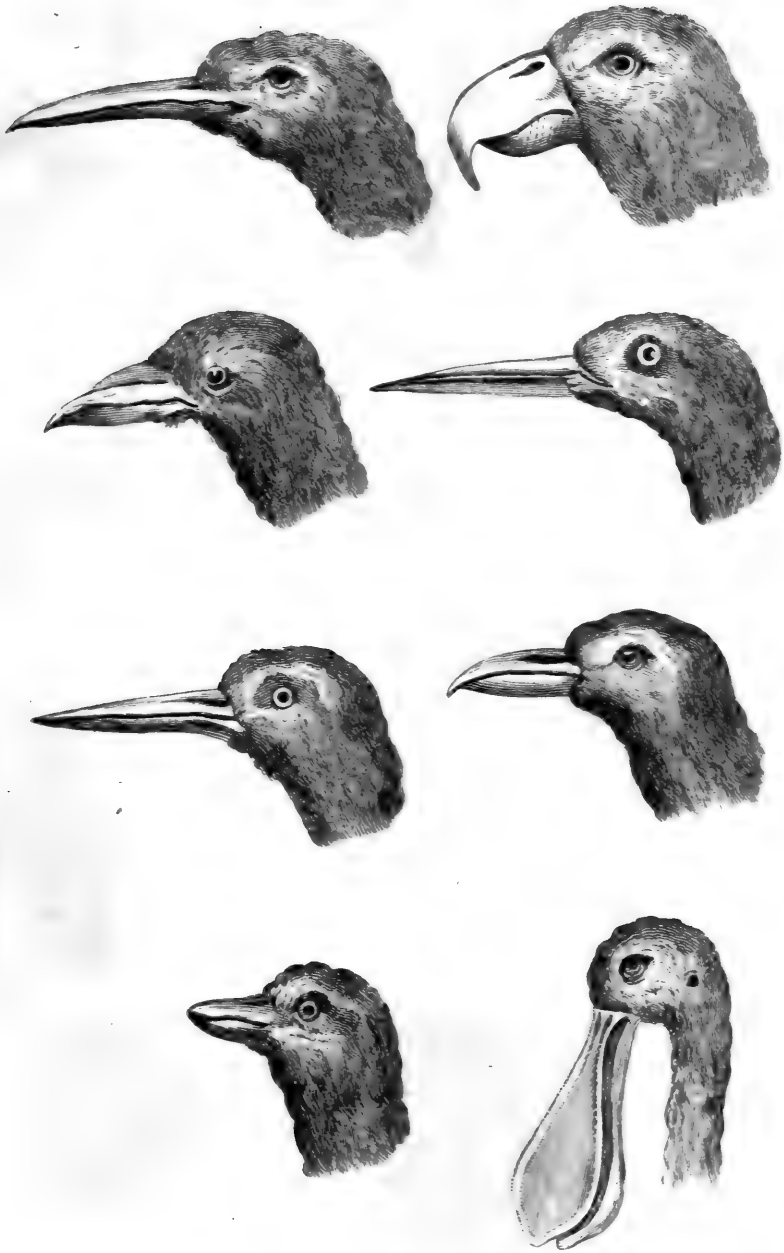
THE legs and toes diſtinguiſh land from water fowl. Land birds have divided toes, without any membranes between them. Thoſe that wade, have legs uſually long and naked; thoſe that ſwim, have the toes webbed together: theſe are leading diſtinctions of nature itſelf.

Land birds of the rapacious kind, have a large head, a ſtrong crooked beak, notched at the end; ſtrong ſhort legs, and ſharp crooked talons; bodies fibrous and muſcular; wings well feathered and expanſive. The ſight of ſuch as prey by day is aſtoniſhingly quick; and ſuch as ravage by night ſee objects in obſcurity with extreme preciſion.

Formed for war, they lead a life of ſolitude and rapacity. Their fierceneſs extends even to their young, which they force from the neſt, at a time when they ſtill ſhould protect and ſupport them.

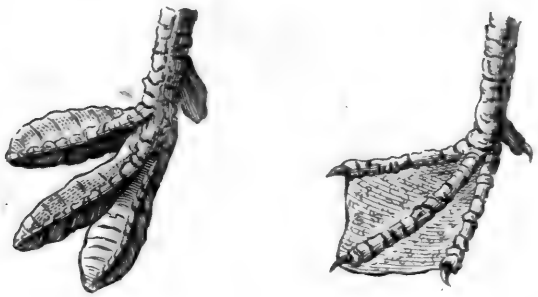
Birds of prey are remarkable for one ſingularity. The males are a third leſs, and weaker than the females. Hence the male is called by falconers, a *tiercel*; a tierce or third leſs than the other. The females are of greater ſize, more beautiful and lovely for ſhape and colours, ſtronger, more fierce and generous, than the males: probably it is neceſſary for the female to be thus ſuperior, that ſhe may efficaciouſly protect herſelf, and her young, not only from enemies, but from the male himſelf; ſince it is out of her power to ſecrete them, as we have ſeen the females of beaſts of prey. Otherwiſe perhaps ſome acceſs of fury from diſpleaſure or deſpair might prompt him to deſtroy them.

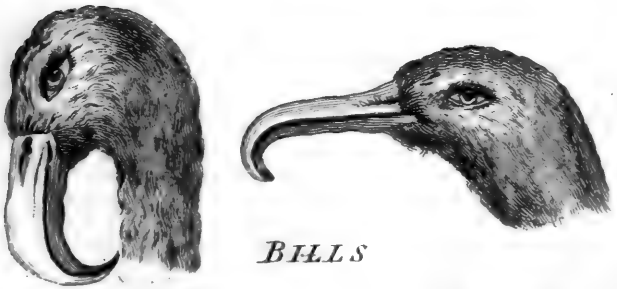
BIRDS *BILLS.*



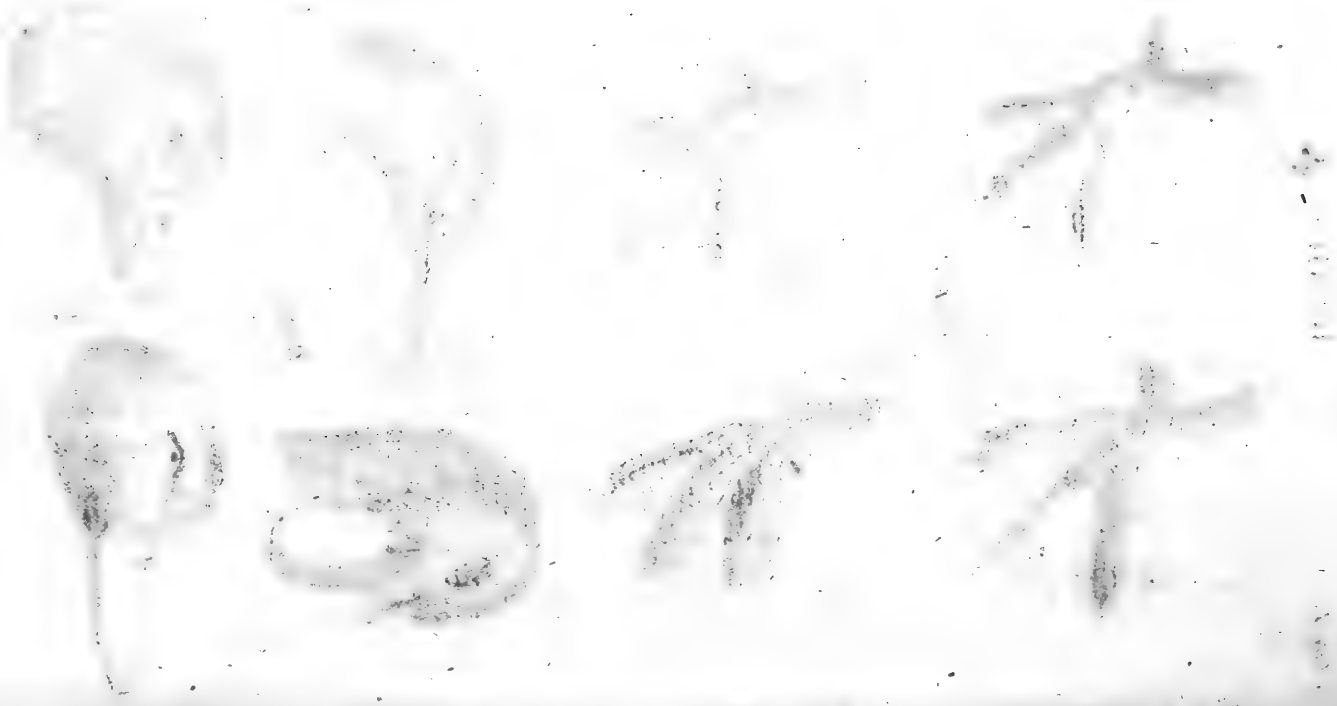
BIRDS

FEET





BILLS



The Great Eagle.

THE EAGLE, AND ITS AFFINITIES.

OF theſe the Golden Eagle is the largeſt. Weighs twelve to eighteen pounds. His length three feet to three and a half; extent of wings, ſeven feet to eight and a half; bill three inches long, deep blue colour; eye hazel. His ſight and ſmell very acute. Head and neck clothed with narrow ſharp-pointed feathers, deep brown bordered with tawney; thoſe on the crown of the head, by age, become grey. The body throughout, is dark brown; the back feathers clouded with a deeper ſhade. Wings reach to the end of the tail: The quill feathers are chocolate colour, the ſhafts white. Tail deep brown, barred and blotched with obſcure aſh-colour, uſually white at the roots of the feathers. Legs yellow, ſhort, very ſtrong, three inches in circumference, feathered to the very feet. Toes covered with large ſcales, armed with formidable claws, the middle one two inches long.

Found in mountainous and ill-peopled countries; breed among the loftieſt cliffs, the ſame neſt ſerves them for life. Powerful but magnanimous, diſdains ſmaller plunder; nor, till after long provocation, puniſhes the teazings of the rook or the magpie. Diſdains to ſhare the plunder of another bird: never ſtoops to carrion; never returns to the ſame carcaſs. Solitary, keeps the deſert to himſelf; of ſparkling eyes; ſtrong breath; loud and terrifying cry; fierce, proud, not eaſily tamed, even by great patience and much art: though taken young, and ſubdued by long aſſiduity, ſtill dangerous, and often to its maſter. If, when let looſe, it firſt ſtoop toward the ground, then riſe perpendicularly into the clouds, it quits its domeſticity for ever; but if brought to an attachment for its feeder, is highly ſerviceable, both for pleaſure and profit: will hunt not only game, but the fox, or wolf.

Of all birds flies higheſt, and has the quickeſt eye (but his ſmell far inferior to the vulture). Purſues by ſight. When he has ſeized his prey, ſtoops from his height, as if to poiſe its weight: always lays it on the ground before he carries it off. Finds it difficult to riſe when down; ſeizes geeſe, cranes, hares, lambs, and kids; often deſtroys fawns and calves, drinks their blood, and carries part of their fleſh to his retreat. Infants have been deſtroyed by them. Smith, in his hiſtory of Kerry, relates, that a poor man in that country got a comfortable ſubſiſtence for his family, during a ſummer of famine, out of an eagle's neſt, by robbing the eaglets of food, clipping their wings, and retarding their flight.

Her eggs ſeldom exceed two in the larger ſpecies, and three in the ſmalleſt. Are hatching about thirty days; frequently one egg is addled. It is aſſerted, that when the young are ſomewhat grown, the mother kills the moſt feeble or the moſt voracious. They are firſt white, then yellow; at laſt light brown. Age, hunger, captivity, diſeaſes, make them whiter. Is ſaid to live above an hundred years; and to die, not of old age, but from the beak turning inward on the under mandible, and thus preventing their taking food. Drinks but ſeldom, perhaps, at liberty not at all, as the blood of his prey ſerves to quench his thirſt.

The Sea-Eagle and the Oſprey live chiefly upon fiſh. Build their neſts on the ſea-ſhore, by the ſides of rivers, on the ground among reeds. Often lay three or four eggs, rather leſs than thoſe of a hen. They catch their prey, by darting down upon them.

The Bald-Eagle of North Carolina has peculiar habits. When the eaglets are juſt covered with down, and a ſort of white woolly feathers, the female eagle lays again. Theſe eggs are hatched by the warmth of the recent young, whereby the flight of one brood makes room for its juſt hatched ſucceſſors. Theſe birds fly very heavily. They often attend a kind of fiſhing-hawk, which they ſtrip of its prey. Generally alſo attend fowlers in the winter, and ſeize birds that are wounded.

M. Buffon conſiders, as genuine eagles, only the golden eagle firſt deſcribed, the common eagle, and the little eagle; thereby ſeparating thoſe which reſide entirely on land, from thoſe which prey in waters.

The *common eagle* is brown, head and upper part of the neck inclining to red; tail-feathers white, blackening at the ends; outer ones, on each ſide, aſh-coloured; legs covered with feathers of a reddiſh brown.

The *bald eagle*, brown; head, neck and tail-feathers white; thoſe of the upper part of the leg brown.

The *white eagle*, the whole white.

The *rough-footed eagle*, dirty brown; ſpotted under the wings, and on the legs, with white; the tail-feathers white at the beginning and point; leg-feathers dirty brown, ſpotted with white.

The *white-tailed eagle*, dirty brown; head white; ſtems of the feathers black; rump inclining to black; tail-feathers, firſt half black, the end half white; legs naked.

The *erne*, dirty iron colour above, iron mixed with black below: head and neck aſh, mixed with cheſnut; points of the wings blackiſh; tail-feathers white; legs naked.

The

The *black eagle*, blackiſh; head and upper part of the neck mixed with red; tail-feathers, the firſt half white, ſpeckled with black, the other half blackiſh; leg-feathers dirty white; thought to be only a variety of the common brown eagle.

The *ſea eagle*, inclining to white, mixed with iron brown; belly white, with iron coloured ſpots; covert feathers of the tail whitiſh; tail-feathers black at the extremity; the upper part of the leg-feathers iron brown.

The *oſprey*, brown above; white below; back of the head white; outward tail-feathers, on the inner ſide, ſtreaked with white; legs naked.

The *Jean le blanc:* above, browniſh grey; below, white, ſpotted with tawney brown; tail-feathers on their outſide and extremity brown; inſide, white, ſtreaked with brown; legs naked.

The *eagle of Braſil*, blackiſh brown; aſh colour, mixed in the wings; tail-feathers white; legs naked.

The *Oroonoko eagle:* with a topping, above, blackiſh brown; below, white, ſpotted with black; upper neck yellow; tail-feathers brown, with white circles; leg-feathers white, ſpotted with black.

The *crowned African eagle*, with a topping; the tail of an aſh colour, ſtreaked on the upper ſide with black.

The *eagle of Pondicherry:* cheſnut colour; the ſix outward tail-feathers black one half. Said to be the moſt highly ornamented bird of the kind, in regard to mixture of colours.

THE VULTURE, AND ITS AFFINITIES.

VULTURES are diſtinguiſhed by the nakedneſs of their heads and necks, which are only covered with a very ſlight down, or a few ſcattered hairs. Their eyes are prominent. Claws ſhorter, leſs hooked than the eagle's. The inſide of the wing covered with thick down, different from all other birds of prey. Their attitude and their flight heavy.

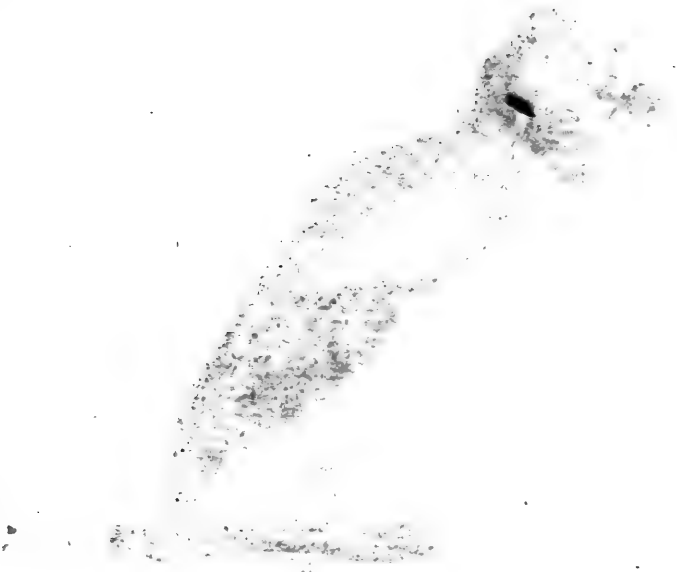
The Golden Vulture ſeems foremoſt of the kind. From the beak to the tail, is four feet and a half; to the claws forty-five inches. The upper mandible nearly ſeven inches long; the tail twenty-ſeven. Neck, breaſt

breaſt and belly red; faint on the tail, deeper near the head: the back black; wings and tail yellowiſh brown.

Cruel, unclean, indolent; amazingly acute of ſmell, having two large noſtrils without, and an extenſive olfactory membrane within. Have both a crop and a ſtomach; which may be regarded as a kind of gizzard, from the extreme thickneſs of its muſcles; whereby they ſeem adapted to eat corn, &c. when neceſſary for ſubſiſtence.

In Africa and Aſia, are found in great abundance. The inſide down of their wing is converted into a warm kind of fur, and is ſold in the Aſiatic markets. In Egypt are great flocks of them around the city of Grand Cairo, which are protected, and repay that protection by their ſervices, in devouring the carrion and filth which might otherwiſe corrupt the air. In America they follow the hunters at a little diſtance: when they ſee a beaſt flead and abandoned, they call out to each other, pour down on the carcaſs, and pick its bones bare. "At the Cape of "Good Hope," ſays Kolben, "they have a wonderful method of ſepa- "rating the fleſh from the bones, yet leaving the ſkin entire. It often "happens that an ox returning home from the plough, lies down by the "way: then, if the vultures perceive it, they fall furiouſly down, and "inevitably devour him. They ſometimes attempt them grazing, and, "to the number of a hundred, or more, make their attack together. "Their ſenſe of ſmelling is ſo exquiſite, that the inſtant a car- "caſs drops, the vultures, floating from all quarters, come ſouſing "on their prey." They eat lambs, &c. ſerpents are their ordinary food. They perch, ſeveral together, on old pine and cypreſs-trees, where they continue all the morning, with their wings unfolded: nor are they fearful, but ſuffer people to approach them very near, particularly when they are eating. Their ſloth, filth, and voraciouſneſs almoſt exceed credibility. When they have liberty to feed at their eaſe, they ſo gorge themſelves, that they are unable to fly; but keep hopping along when purſued (at all times are of ſlow flight, and with difficulty riſe from the ground); being utterly helpleſs: But they often vomit up what they have eaten, and then they fly off with greater facility.

There is perpetual enmity between the vulture of Brazil, and the crocodile, which lays its eggs (above a hundred) in the ſands, on the ſide of the river. She takes every precaution to hide the place: but a number of vultures (or galinaſſos, as the Spaniards call them) ſit, ſilent and unſeen, concealed in ſome neighbouring foreſt, and view her operations. They wait till ſhe has laid all her eggs; has covered them carefully



The King of the Vultures.

fully under the ſand, and is retired; then, encouraging each other with cries, they pour down on the neſt, lay the eggs bare, and devour the whole brood without remorſe.

Lay two eggs at a time, produce once a year. In Europe make their neſts in inacceſſible cliffs, nor deſcend but when forced by inclement ſeaſons. Among the moſt remarkable birds of this claſs, is the following——

The king of the vultures is native of America, in ſize equals a turkey; his wings not ſo long as many vultures, his bill ſtrong and thick, its baſe environned and covered with a large indented orange-coloured ſkin, riſing to the head, ſomewhat like the comb of a cock; in this are placed the noſtrils, which are oblong; this comb falls on either ſide, according to the movement of the bird's head. The eyes are ſurrounded by a ſcarlet-coloured ſkin, the iris has the colour and luſtre of pearl, the head and neck are without feathers; covered with a ſkin, which is fleſh-coloured on the top of the head, bright red behind, duſkier before. Below the hind part of the head riſes a little tuft of black down, from whence iſſues and extends on each ſide, under the throat, a wrinkled ſkin; browniſh, behind mingled with red and blue, ſtreaked with little lines of black down; the cheeks or ſides of the head are covered with black down; and between the bill and the eyes, behind the corner of the bill, is on each ſide a ſpot of browniſh purple; on the upper part of the neck, is on each ſide a ſmall longitudinal ſtreak of black down; the ſpace between them duſky yellow, the ſides of the neck are red gradually changing to yellow; below the naked part of the neck, is a collar formed by long ſoftiſh feathers, deep aſh-coloured, which ſurrounds the neck, and falls on the breaſt. Into this collar the bird ſometimes ſhrinks his neck, and part of his head, as into a kind of hood, whence ſome have called him monk. The breaſt, belly, thighs, and legs, are white; the wings and tail black. The feet are in ſome yelloweſh, in others blackiſh; the claws are ſhort and crooked. It is the moſt beautiful of the family. Neither its habits or inſtincts vary from thoſe of the tribe; being ſlow, cowardly, living on rats, lizards, ſerpents, and carrion or excrement, when it happens. The fleſh is ſo bad, that even ſavages themſelves cannot abide it.

THE

THE FALCON, AND ITS AFFINITIES.

OF many of the ancient falcons, formerly uſed in the chace, we know only the names. Thoſe uſed at preſent, are the gyr-falcon, the falcon, the lanner, the ſacre, the hobby, the keſtril, and the merlin. Theſe are called the long-winged-hawks, to diſtinguiſh them from the goſs-hawk, the ſparrow-hawk, the kite, and the buzzard, that are of ſhorter wing; and too ſlow, cowardly, indolent, or obſtinate to furniſh amuſement in the field. Of the generous tribe of hawks, the wings reach nearly as low as the tail. The firſt quill of the wing longeſt; which the ſecond always nearly equals, and terminates in a *point*, which begins to diminiſh at about an inch from its extremity. In the baſer races, the tail is longer than the wings, the firſt feather of the wing is *rounded* at the extremity, and the fourth feather the longeſt.

The generous race is from this length of wing ſwifter, from their ſwiftneſs bolder, and, from native generoſity, more docile than the other.

The gyr-falcon exceeds all others in ſize, approaching nearly in magnitude to the eagle. The top of the head is flat, aſh-coloured; bill blue, ſtrong, thick, ſhort; on the back and wings marked with black ſpots heart-ſhaped. Courageous and fierce, he fears not the eagle himſelf; but chiefly flies at the ſtork, heron, and crane. Native of the colder regions of the North, but maintains his ſtrength and courage in milder climates.

The falcon-gentil and the peregrine-falcon, are much leſs than the gyr, and about the ſize of a raven. The falcon-gentil moults in March, often ſooner; the peregrine-falcon moults in Auguſt. The peregrine is ſtronger in the ſhoulder, has a larger eye, more ſunk in the head, his beak ſtronger, longer legs, and his toes better divided.

The lanner is now little known in Europe. The ſacre is diſtinguiſhed by legs of a blueiſh colour. The hobby is uſed for ſmaller game, for daring larks, and ſtooping at quails. The keſtril was trained for the ſame purpoſes. The courage of the merlin, though he is not much larger than a thruſh, is formidable to birds ten times his ſize. He has often been known to kill a partridge or a quail at a ſingle pounce. In this he may be conſidered as a ſpecimen of the ſpecies.

The hare, partridge, or quail profitably repay the trouble of taking; but the moſt delightful ſport is the chace of the heron, kite, or wood-lark. For theſe, when threatened by the approach of the hawk, riſe into the ſkies,

almoſt perpendicularly (accompanied by their ardent purſuer, who tries to riſe above them), till they are loſt in the clouds; they deſcend ſtruggling together; but after a deſperate defence, the falcon proves victorious. When a lark is purſued by a couple of merlins, the amuſement is, to ſee one of them mounting to get the aſcendant of the lark, while the other, lying low for the beſt advantage, waits the ſucceſs of its companion's efforts; thus, while one ſtoops to ſtrike its prey, the other ſeizes it coming down. The kite or the goſs-hawk approach their prey ſide-ways: theſe falcons dart perpendicularly on their game; deſcending from the clouds an amazing height, with inevitable ſwiftneſs.

The baſer races being leſs courageous are more patient; and, leſs ſwift, are more cunning. The kite, diſtinguiſhed by his forky tail, and his ſlow floating motion, ſeems almoſt ever on the wing, and to reſt on the air without effort. He lives on accidental carnage; ever prowling, hungry and deſperate; is exquiſite of ſight; when to us inviſible by his height, will fly round and round to mark a clutch of chickens, and ſuddenly dart like lightning on one of the brood, and carry it off in ſpite of reſiſtance.

There is a black kite, whoſe tail is not forked, in ſize rather leſs.

The buzzard is ſluggiſh, inactive, and often remains perched whole days on the ſame bough. Lives more on frogs, mice, and inſects, than on birds; or by robbing the neſts of other birds, and ſucking their eggs. His figure expreſſes ſtupidity of diſpoſition. Some are white, ſome have whitiſh heads, others are ſpotted.

The honey-buzzard, the moor-buzzard, and the hen-harrier, all of this ſtupid tribe, differ chiefly in ſize, growing leſs in the order named. The goſs-hawk and ſparrow-hawk are ſhort-winged, and unfit for training, however injurious they may be to the pigeon-houſe. Length of body 20 or 21 inches; extent of wings expanded, four feet and a half; tail eight inches.

This kind being greatly ſpread has ſeveral varieties in foreign parts, differing rather by plumage than manners, and by dimenſion than conformation.

THE

BUTCHER-BIRDS.

THE great Butcher-Bird is about as large as a thruſh; is aſh-coloured; its bill black, an inch long, and hooked, whereby, together with its carnivorous appetite, it ranks among rapacious birds; its legs and feet ſlender. The leſſer Butcher-Bird is little above the ſize of a lark; the ſmalleſt not ſo big as a ſparrow. Live as well on fleſh as on inſects, and thus partake, in ſome meaſure, of double qualities.

The moſt redoubtable birds of prey reſpect them; the kite, the buzzard, and the crow, ſeem rather to fear than ſeek an engagement. Nothing in nature better diſplays the reſpect paid to courage, than to ſee this little bird, apparently ſo contemptible, fly in company with the lanner, the falcon, and other tyrants of the air, without fearing their power, or avoiding their reſentment. Small birds, which are its uſual food, it ſeizes by the throat, and ſtrangles in an inſtant. When it has killed a bird or inſect, it is aſſerted that it fixes them on ſome neighbouring thorn, and, when thus ſpitted, pulls them to pieces with its bill. It is ſuppoſed, that as Nature has not given this bird ſtrength ſufficient to tear its prey to pieces with its feet (as hawks do) it has recourſe to this expedient.

During ſummer, ſuch of them as conſtantly reſide here (for the ſmaller red butcher-bird migrates in autumn, and returns in ſpring) remain among the mountainous parts of the country; but in winter they deſcend into the plains. The larger kind neſtle on the higheſt trees; the leſſer build in buſhes; lay about ſix eggs, white, encircled at the bigger end with a ring of browniſh red. The female feeds her brood with caterpillars and other inſects while very young; but ſoon accuſtoms them to fleſh, which the male procures with ſurpriſing induſtry. The whole brood live in one family, generally compoſed of the male, female, and five or ſix young. It is eaſy to diſtinguiſh theſe birds at a diſtance, not only by their going in companies, but by their manner of flying, which is always up and down, ſeldom direct or ſideways.

The woodchat is brown, and not red. There is ſtill another, leſs than the former, found in the marſhes near London; a bird of prey, though not

not much bigger than a tit-mouſe. Of foreign birds of this kind there are ſeveral varieties, whoſe manners are little known. The hot climates produce moſt, and among them one tufted.

OF THE

OWL KIND.

BIRDS of this kind have one common mark, by which they are diſtinguiſhed: their eyes are formed for ſeeing better in the duſk than in ſun-ſhine, whereby they are fitted for a life of nocturnal depredation. In theſe birds the pupil is capable of opening very wide, or ſhutting very cloſe; beſide this, there is an irradiation on the back of the eye, and the iris has a faculty of reflecting the rays of light, to aſſiſt viſion in gloomy places, where theſe birds frequent: but they do not ſee beſt in the darkeſt nights, but in the duſk of evening, or the grey of morning. When the moon ſhines is the time of their moſt ſucceſsful plunder. The faculty of nocturnal viſion is not alike in all: ſome ſee by night better than others; and ſome are ſo little dazzled by day-light, as to perceive their enemies. The white, or barn-owl, ſees with ſuch exquiſite acuteneſs in the dark, that though the barn has been ſhut at night, and the light excluded, it perceives the ſmalleſt mouſe that peeps from its hole; and the brown horn-owl is ſeen to prowl along the hedges by day, ſometimes with ſucceſs.

Owls may be divided into thoſe with horns, and thoſe without. The horns are two or three feathers that ſtand up on each ſide the head over the ear.

Of the horned kind is, the GREAT HORNED OWL, which appears as large as an eagle; but obſerved more cloſely is much leſs; his extent of wing about five feet: his horns are compoſed of feathers, that riſe above two inches and a half, and which he can erect or depreſs at pleaſure; his eyes are large and tranſparent, encircled with an orange-coloured iris; his ears large and deep, probably he poſſeſſes moſt exquiſitely the ſenſe of hearing; his plumage is reddiſh brown, marked on the back with black and yellow ſpots, on the belly yellow only.

The COMMON HORNED OWL is much ſmaller; his horns, about an inch long, conſiſt of ſix feathers, variegated with black and yellow; his extent of wing about three feet. A ſmaller kind of horned owl is little larger than a black-bird, whoſe horns, remarkably ſhort, are compoſed but of one feather, not above half an inch high.

To theſe ſucceeds the tribe without horns. The HOWLET is the largeſt of this kind, with duſky plumes, and black eyes; the SCREECH-OWL ſmaller, with blue eyes, and iron-grey plumage; the WHITE OWL, about equal in ſize, with yellow eyes and whitiſh plumage; the GREAT BROWN OWL, leſs, with brown plumage and a brown beak; and the LITTLE BROWN OWL, with yellowiſh-coloured eyes, and orange-coloured bill.

In proportion as one of theſe bears day-light beſt, he begins earlier in the evening his purſuit of prey. The cavern of a rock, a hollow tree, the battlements of a ruined caſtle, wherever is obſcurity, there they retreat; if they be ſeen out of theſe in the day-time, they may be conſidered as wandering, and ſurrounded with danger. At the approach of evening they ſally forth, and ſkim along the hedges; but the barn-owl, who lives chiefly upon mice, takes his reſidence upon ſome ſhock of corn, or the point of ſome old houſe; and there watches in the dark, with the utmoſt perſpicacity and perſeverance. They all have an hideous note, which has ſomething terrifying in it; as in the ſilence of midnight, it breaks the general pauſe with a variation, alarming and diſagreeable. The prejudices of mankind have united with their ſenſations to make the cry of the owl diſagreeable, and the ſcreech-owl's voice *was* conſidered among uninformed people as ominous, whereas it is his note of tenderneſs to his mate. While preying, they are ſilent.

When one is ſurpriſed by day-light, he takes ſhelter in the firſt tree or hedge that offers concealment, but often, with all his precaution, is deſcried by the birds of the place. The ſmalleſt, the feebleſt, the moſt contemptible of his enemies, are then foremoſt to torment him. They increaſe their cries and turbulence round him, and flap him with their wings. Aſtoniſhed and dizzy, he only replies to their mockeries by awkward and ridiculous geſtures, by turning his head, and ſtupidly rolling his eyes. An owl by day ſets the whole grove in an uproar. Sometimes they hunt him till evening returns; but this reſtoring him his ſight, thoſe birds, which a few minutes before came to provoke their enemy, now fly him with terror, as lately they teaſed him with inſolence.

OF THE

POULTRY KIND.

UNDER this claſs we may rank our cock, peacock, turkey, pintada or Guinea-hen, pheaſant, buſtard, grous, partridge, and quail. Theſe being granivorous, fleſhy, and delicate, are among birds, what beaſts of paſture are among quadrupeds. Their ſhort wings are ill formed for wandering, and their ſhort bills for offence; their legs are ſtrong; but their toes made for ſcratching up, and not for holding or tearing; while their aptitude to fatneſs and fleſh, renders them unwieldy, and almoſt local, incapable of ſtraying far from each other. They are furniſhed with a very ſtrong ſtomach (or gizzard); their voraciouſneſs ſcarce knows any bounds; even in captivity, they enjoy the pleaſure of eating; and ſoon grow fat and unwieldy.

Among the habits peculiar to this claſs of birds is that of duſting themſelves, by lying flat in ſome duſty place, and with their wings and feet ſcattering the duſt over their whole body. For what reaſon is not eaſy to explain, whether to deſtroy inſects, or to prevent adheſion of their feathers.

THE BUSTARD

IS the largeſt land-bird native of Britain. The increaſed cultivation of the country, and the extreme delicacy of its fleſh, has greatly thinned the ſpecies; notwithſtanding it inhabits only the open plain, where its food is abundant, and where every invader may be ſeen at a diſtance.

The male weighs about twenty-five pounds (the female is about half the ſize: a remarkable difference). The neck is a foot long, the legs a foot and a half, covered with ſmall ſcales; three toes on each foot; under the foot is a callous tubercle ſerving as a heel. The wings are nine feet from tip to tip; flies with great difficulty, but can continue ſeveral miles. The head and neck of the male are aſh-coloured; the back

 barred

barred tranſverſely with black and bright ruſt colour. The greater quill feathers are black; the belly white; the tail, conſiſting of twenty feathers, is marked with broad red and black bars, the legs duſky. The male (only) has a tuft of feathers, about five inches long, on each ſide the lower mandible. He (only) has alſo a pouch, whoſe entrance lies immediately under the tongue, capable of holding near ſeven quarts of water. This is probably filled upon proper occaſions, to ſupply the hen when ſitting, or the young before they can fly.

They haunt the plains, downs, heaths and uplands. Their food is corn, berries, and large earth-worms, whoſe moiſture enables them to live on plains which furniſh but little water. They ſwallow pebbles like the oſtrich. They have always centinels placed at proper eminences, which warn the flock of the ſmalleſt appearance of danger. Are ſeldom ſhot, but often run down by greyhounds; having fed themſelves ſo very fat, that they are unable to fly without great preparation, which gives an advantage to their purſuers.

They ſeparate in pairs about the latter end of ſummer, if there be a ſufficiency of females; if not, the males fight till one of them falls. The male *ſtruts* around the female, and ſpreads his tail like a turkey-cock. They neſtle on the ground, juſt ſcraping a hole in the earth, ſometimes lining it with a little long graſs or ſtraw. Lay two eggs, the ſize of a gooſe-egg, pale olive brown, marked with darker ſpots. They hatch in about five weeks, and the young run about as ſoon as they are out of the ſhell. They aſſemble in flocks in October, and keep together till April.

There is a ſmaller buſtard not half the ſize of this, being only eighteen inches long, but of the ſame manners. Found in France; is rare. Its fleſh is brown, but excellent. Cunning to a proverb.

Mr. Pennant places the Stone-Curlew as a third of this kind.

In Arabia is a tufted buſtard, called Lo-pong.

In Africa a buſtard aſh-coloured, and black; which has been miſtakenly called a flying-oſtrich.

In India, a ſmall kind with longer legs, colours black, brown, and grey; inhabits Bengal.

THE

THE TINAMOUS

PARTAKES much of the buſtard and partridge. But whereas theſe European birds never perch on trees, thoſe which reſemble them in America perch; and even many of the web-footed kinds (which in Europe is never ſeen): for though they frequent the water in the day-time, they return to rooſt on trees at night. To this they are prompted by neceſſity, as well to avoid jaguars and beaſts of prey, as ſerpents, and the innumerable hoſts of inſects which ſwarm in thoſe countries. The ants alone compoſe immenſe columns, and would quickly devour any young birds they could envelope during their ſleep: certain quails which live on the ground are often ſwallowed by ſerpents. Perhaps theſe quails are new-comers, and hereafter may improve in carefulneſs.

The tinamous is often called *partridge* by the coloniſts: but has a ſlender bill, long, ſoft at its extremity, black above, white below; noſtrils oblong, placed toward the middle of the bill; the mind toes ſhort; nails long, large, and hollow; feet ſcaly; wings ſhort. They perch upon trees during night, ſometimes during day; never ſeek great trees, or high branches. Are of white fleſh, good to eat, feed on fruits, or coffee-berries. Scratch a hole for their neſts, lay many eggs, fly heavily, but run ſwiftly; the female exceeds the male in ſize, which in Europe is peculiar to birds of prey. There are many varieties; one equal to a pheaſant in ſize. They live in woods. A ſmall kind neſtles in trees among the low branches.

THE TURKEY,

WITH us, when young, is the tendereſt of birds; yet wild, it is found in plenty among the foreſts of Canada, where they go in troops of hundreds: much larger than in their ſtate of domeſticity, and more beautiful; their feathers being dark grey, bordered on the edges with bright gold colour. The Indians hunt them with a dog, which, when they firſt diſcover, they leave far behind: he follows, ſenſible they muſt ſoon be tired, as they cannot go full ſpeed long; and at laſt, forces them to take ſhelter in a tree, where they ſit quite ſpent and fatigued, till the hunter comes up, and, with a long pole, knocks them down: if one is ſhot, the others never attempt an eſcape, or take warning.

Stupid, vain, querulous, yet without weapons. Every body knows the ſtrange antipathy of the turkey-cock to red; how he ſwells, and, with his pecular gobbling, flies to brave it. If the head of a turkey be ſmeared with dirt, the reſt run to attack it with all ſpeed. Two of them, thus diſguiſed, will fight each other till almoſt ſuffocated with fatigue and anger. Weak and cowardly againſt other animals; there is none, how contemptible ſoever, that will boldly face the turkey-cock, but he will fly from: while, with the inſolence of a bully, he purſues any that ſeems to fear him; yet ſometimes they will defend themſelves againſt vermin, as ferrets, &c.

The female ſeems milder. Hunts about in queſt of grain and inſects; is delighted with the eggs of ants and caterpillars. Lays eighteen or twenty eggs, larger than thoſe of a hen, whitiſh, but marked with ſpots reſembling freckles. Her young are extremely tender at firſt, and often have not ſtrength to pierce the ſhell which includes them.

Some are white, others black and white; often white and browniſh yellow.

Properly ſpeaking, the turkey has two tails, one ſuperior, the other inferior; the firſt compoſed of eighteen great feathers, which he can erect at pleaſure, the other horizontal, as uſual. The male has a ſpur on his leg. Some are tufted.

When grown up, turkies are hardy birds, bearing even expoſure to the rigour of winter, and feed themſelves at very little expence. Thoſe of Norfolk are ſaid to be the largeſt of this kingdom, weighing from twenty to thirty pounds. In the Eaſt Indies (where they are known only in their domeſtic ſtate) they grow to the weight of ſixty pounds. Abundant in the Antilles, where they breed three or four times a year.

THE PEACOCK.

WHEN this bird appears with its tail expanded, none of the feathered creation can vie with its beauty; but its horrid ſcream abates the pleaſure of viewing it, while its gluttony and depredation render it a noxious domeſtic. Sheds its tail annually, and then conceals itſelf, as if aſhamed. Is ſaid to be very ſuſceptible of flattery, and to ſpread

ſpread his tail if careſſed, but if contemned, to cloſe it. Is two years coming to maturity. Has a ſpur on each leg.

Peacocks were brought from the Eaſt-Indies: they are ſtill found in vaſt flocks, wild, in the iſlands of Java and Ceylon.

The peacock's fleſh keeps longer unputrefied than that of any other animal; even ſeveral years. The peacock feeds on corn, prefers barley. Is very proud and fickle; every kind of food it will at times covet and purſue; inſects and tender plants often. Though it flies heavily, walls cannot eaſily confine it; it ſtrips the tops of houſes of their tiles or thatch, lays waſte the labours of the gardener, roots up his choiceſt ſeeds, and nips his favourite flowers and buds.

He requires five females at leaſt; and if there be not a ſufficient number, he will even force the ſitting hen. For this reaſon, the pea-hen endeavours to hide her neſt. She ſits twenty or thirty days. She lays five or ſix eggs in this climate before ſhe ſits. Ariſtotle ſays twelve; and probably, in her native climate, ſhe may be more prolific: In India to twenty or thirty. The young do not ſhew their tufts till they are a month old: the cock does not acknowledge them till then, but drives them off. Being troubled with inſects, they ſcratch each other on the head.

There are varieties of this bird, ſome of which are white; yet retaining ſome marks of the *eyes* on their tail-feathers, others creſted: that which is called the peacock of Thibet, is the moſt beautiful of the feathered creation, containing in its plumage all the moſt vivid colours, red, blue, yellow, and green, diſpoſed in an almoſt artificial order, to pleaſe the eye.

THE HOCCOS

ARE ſtrangers to Europe, and belong only to the hot climates of America. Their various names, as given by various tribes of Indians, have greatly augmented their ſeeming numbers: their real varieties are conſiderable.

The hocco is nearly the ſize of a turkey; diſtinguiſhed by a creſt, uſually black, ſometimes black and white, two or three inches high, reaching from the baſe of the bill to the back of the head: this the bird

can

can erect or depreſs at will: the creſt is compoſed of narrow feathers inclining backward, but their points bending forward: among them are ſeveral incloſed in a kind of covering half their length. The reigning colour of the plumage is black velveted, ſometimes ſpeckled with white. Some have a yellow ſkin at the baſe of the bill, which includes the noſtrils; this ſkin, extending on each ſide the head, ſurrounds the eyes; in others, it becomes a kind of knob on the baſe of the ſuperior mandible. Peaceable, and even ſtupid, ſociable, and domeſtic, eaſily tamed; though one wanders far in the day-time, he returns at evening, and knocks at the door for admiſſion; pulls the ſervants by their clothes, when they forget him: follows his maſter every where. In his wild ſtate, inhabits the mountains; feeds on fruits, perches on trees during night; flies heavily, walks boldly; his fleſh is white, good eating, but rather dry.

THE PHEASANT

WAS brought into Europe from the banks of the Phaſis, a river of Colchis, in Aſia Minor; from whence their name; and are ſaid to be firſt brought by the Argonauts in their famous expedition. Theſe are ſtill the fineſt known.

Next to the peacock, are the moſt beautiful of birds, as well for the vivid colour of their plumes, as for their happy mixtures and variety.

The iris is yellow, the eyes ſurrounded with ſcarlet, ſprinkled with ſmall ſpecks of black. On the fore part of the head are blackiſh feathers mixed with ſhining purple. The top of the head and the upper part of the neck are tinged with a ſhining darkiſh green. In ſome, the top of the head is of a ſhining blue; the head, and upper part of the neck, appear either blue or green, as differently beheld by the ſpectator. The breaſt, ſhoulders, middle of the back, and the ſides under the wings, have a blackiſh ground, with reflections, black or purple, according to different lights, under which is a tranſverſe ſtreak of gold colour. The tail, from the middle feathers to the root, is about eighteen inches; the legs, feet and toes, are duſky. On the legs are black ſpurs, ſhorter than thoſe of a cock. A membrane larger than uſual among the poultry kind connects the toes, as if advancing to the water-bird claſſes. The male is moſt beautiful. Its fleſh is conſidered as the greateſt dainty.

The

The pheaſant has multiplied in its wild ſtate, and, as if diſdaining the protection of man, has taken ſhelter in woods and foreſts (not mountains), attached to its native freedom; and now wild among us ornaments our parks and plantations, where he feeds on acorns and berries. (In Italy, &c. frequents marſhes.) This ſpirit of independance ſeems to attend the pheaſant in captivity; and is ſo influential as to render him ſolitary. In the woods, the hen lays from eighteen to twenty eggs; in a domeſtic ſtate, ſeldom above ten. Is particular in making her own neſt, in coverts; when wild, ſhe maintains her brood with patience, vigilance, and courage: when tame, ſhe never ſits well; and as for leading her young to their food, ſhe is utterly ignorant where to find it, and they ſtarve, if left ſolely to her. Sits twenty to twenty-five days.

They have no great ſagacity, and are eaſily taken. At night they rooſt on the higheſt trees of the wood, head under the wing; by day they deſcend among the lower brakes and buſhes. The female has ſcarce any voice; that of the male is between the peacock and the pintado, conſequently far from melodious. When taken young into keeping, they become as familiar as chicken; when they are deſigned for breeding, they are put together in a yard, five hens to a cock. The young are very difficult to rear, and muſt be ſupplied with ant-eggs, which is their food when wild: inſects make a variety. Lives ſix or ſeven years. From the common hen, coupled with the cock-pheaſant (for the mixture is not barren), will be produced a ſpecies tamer, ſtronger, and more prolific. This is probably the cocquar, or baſtard pheaſant.

It is aſſerted by ſome, that ſuch is the carnivorous diſpoſition of this bird, that when ſeveral are in the ſame yard, if one ſickens, or ſeems to be pining, the reſt will deſtroy it.

There are white pheaſants, black and white pheaſants, creſted pheaſants, ſpotted pheaſants; but of all others, the golden pheaſant of China is the moſt beautiful; his plumage red, blue, and gold. He is ſmaller than the common. The iris, bill, and feet, yellow; his tail long, no red round his eyes. The female is at firſt but dull in her colours, but in a few years acquires all the brilliancy of the male.

There is alſo a horned pheaſant, having two horny excreſcences on the head, blue, cylindrous, obtuſe, inclining backwards. No red round his eyes, but black hairy-looking feathers, ſomewhat of wattles under throat. His head red.

In America a bird not truly a pheaſant, but repreſentative of the ſpecies named KATRACA. China and Thibet furniſh ſeveral birds allied to the pheaſant, and to the peacock, without being truly either.

THE

PINTADA, OR GUINEA-HEN,

IN ſome meaſure unites the characteriſtics of the pheaſant and the turkey. Has the delicate ſhape of one, and the bare head of the other; has been by Pliny called *humped*, which, though it is not, it is round-backed. Is about the ſize of a common hen, but having longer legs, looks much larger. Has a round back, tail turned downwards. The head covered with a kind of caſque; the plumage black or dark grey, pretty regularly ſpeckled with white ſpots not unlike pearls; has wattles under the bill, which do not proceed from the lower chap (as in cocks), but from the upper, which gives it a peculiar air; while its reſtleſs gait and odd chuckling ſound, often repeated, diſtinguiſh it from all other birds.

By ſome is called the Barbary-hen, by others, the Tamis bird, and by others, the bird of Numidia. We have named it from that part of Africa, whence probably it was firſt brought to us.

In their native country, are ſeen in vaſt flocks in queſt of food. Their habits are like thoſe of the poultry-kind. The male and female are ſo alike, that they can hardly be diſtinguiſhed. The only difference lies in the wattles, which in the cock are bluiſh; in the hen, more inclining tored. Their eggs are ſpeckled: in our climate, they lay but five or ſix in a ſeaſon: but are far more prolific at home, where they will lay a hundred and fifty by proper treatment. They are kept among us rather for ſhew, as their fleſh is little eſteemed, and as they are troubleſome to rear.

There are many varieties; ſome quite white, ſome with red combs, ſome bluiſh; ſome with white bands on the breaſt. Is a quarrelſome bird, of a ſtrong bill, and weak head. Thoſe of St. Domingo often frequent the marſhes.

Mr. Buffon thinks they rather reſemble upon the whole the partridge than the pheaſant. Moſt authors affirm that they little regard their brood. They live on grain and inſects. This bird being African, has had many names: formerly ſome Mahometans ſold them very dear to the Chriſtians, under the name of the Jeruſalem bird; but the fraud being diſcovered, theſe reſold them to other good Muſſulmen at an extravagant rate, under the title of Mecca hens.

THE

THE COCK.

THE cock ſeems the oldeſt companion of mankind, and firſt reclaimed from the foreſt; in conſequence, perhaps, he exhibits the greateſt varieties; there being ſcarce two birds of this ſpecies completely alike. The tail, which ornaments the generality of theſe birds, is wanting in ſome; and not only the tail but the rump. The toes, which are uſually four in the poultry kind, yet in a ſpecies of the cock are five. The feathers, which lie ſo orderly and ſleek in moſt, in a peculiar breed are inverted, and ſtand the wrong way: a ſpecies from Japan, inſtead of feathers ſeems covered with hair. Some have feathers to the feet, ſome even to the claws. The cock was one of the foods forbidden among the ancient Britons.

The cock is found wild in the iſland of Tinian, in others of the Indian Ocean, and in the woods on the coaſt of Malabar. Here his plumage is black and yellow; his comb and wattles yellow and purple. The bones of thoſe of the Indian woods, of the Philippine Iſlands, and of St. Jago, when boiled, are black. Probably this tincture proceeds from their food.

His wings being ſhort, he rarely flies, crows indifferently night or day. Some hens crow, but feebly. Drinks by raiſing his head and ſwallowing; ſleeps often ſtanding on one leg, and hiding his head under his wing. On his head a comb, under his chin wattles, which are a double membrane. His claws, when four, are three before and one behind; when five, two behind. His feathers are remarkable, by growing in pairs from the fleſh. His tail has fourteen feathers divided into two parts, uniting at the top. On his legs, ſpurs. He is very watchful and fond of his hens, and jealous alſo.

No animal has greater courage than the cock when oppoſed to one of his own ſpecies. In China, India, the Philippine Iſlands, and all over the eaſt, cock-fighting is the ſport of kings and princes. With us it is declining daily.

A ſingle cock ſuffices for ten or a dozen hens. But he ſoon grows old. Hens alſo, as they for the greateſt part of the year daily lay eggs (in Samogitia, Malacca, and elſewhere, twice a day; in Illyria, ſays Ariſtotle, three times), for the moſt part after three years become effete and barren: for when they have exhauſted all their ſeed-eggs, of which they had but a certain quantity from the beginning, they muſt neceſſarily ceaſe to lay, there being no new ones generated within.

The hen ſeldom clutches a brood of chicken above once a ſeaſon. Will lay in a year above two hundred eggs, provided ſhe be well fed and ſupplied with water and liberty. Her neſt is merely a hole ſcratched into the ground among a few buſhes.

If left to herſelf, the hen would ſeldom lay above twenty eggs, without attempting to hatch: but while her eggs are removed, ſhe continues to lay. In the wild ſtate, the hen ſeldom lays above fifteen eggs. Nothing can exceed the perſeverance and patience of the ſitting hen; ſhe continues for ſome days immoveable, forgetting even food; yet does not know her own eggs, or brood, but rears ducklings, even though they be water-fowl. She carefully turns her eggs, and removes them to different ſituations; in about three weeks, the young give ſigns of a deſire to burſt their confinement. When, by the repeated efforts of their bills, they have broke the ſhell, ſhe continues ſitting till all are excluded; then leads them forth to provide for themſelves: abſtains from all food that they can ſwallow; flies boldly at every invader, and even ſometimes ſurpriſes birds of prey into flight by unexpected reſiſtance; acts the commander, and by variety of notes calls her train to their food, or warns them of approaching danger.

Ten or twelve chicken are the greateſt number a good hen can rear and clutch; but by the artificial method of hatching chicken in ſtoves, as is practiſed at Grand Cairo, they produce thouſands. In our colder climate, the little animal may equally be hatched, but few reach maturity.

A capon may eaſily be taught to clutch chicken by gradually introducing them to his acquaintance.

Chymiſts ſay, the products of the fleſh of a cock and a capon are not alike; capons do not moult, nor crow diſtinctly; but eat, ſleep, and fatten.

An experiment has been tried on young cocks, by *grafting* a ſpur into their comb, which has taken root and grown to the length of two inches and a half, aſſuming the appearance of a horn.

The ſpecies is ſpread throughout the world; was introduced into America from Europe. Some are tufted, their comb is uſually ſmall. The Madagaſcar cock is extremely ſmall, the eggs very diminutive, ſince the hen often hatches thirty. The Java and Bantam breeds are very ſmall. Some are ſo ſhort-legged their wings trail on the ground. The frizzled breed, whoſe feathers ſtand up, are ſuppoſed to be natives of Aſia. The Padua cock is extremely large, and has a double comb and a creſt.

THE

The Agami

THE

COCK OF THE ROCKS,

THOUGH of a uniform colour, is yet among the handſomeſt of America, becauſe his colour and plumage are beautiful. Eats fruits, perhaps for want of grain. He reſembles the cock, but differs by the form of his toes, which are united by a membrane; the firſt and ſecond toes to the third articulation; the ſecond toe to the third, only to the firſt joint. His bill is compreſſed on the ſides toward the extremity; tail ſhort and ſquare; as alſo ſeveral feathers of his wings. His principal diſtinction is his creſt, which is placed longitudinally on his head, in the form of a ſemicircle. This creſt is not ſingle, but double, formed of two planes inclined to each other, and meeting at the ſummit. The male is a beautiful red, the female brown. She has a creſt, but leſs full, leſs elevated, leſs rounded, and further advancing on the bill than the male's. About the ſize of a pigeon. The young male is brown, like the female; becomes red by time. Inhabits deep chaſms among rocks, and dark caverns; ſees and flies during day, but more and better by twilight. They are very wild, can only be ſhot; and that after great patience. Their flight rapid, but ſhort: they ſcratch the ground and beat their wings like the cock, but do not crow; their only cry reſembles the ſyllable *ke*. Wild among rocks, in a ſlight neſt, made of dry wood, lay two eggs, the ſize of pigeon's. The males quit their caverns oftener than the females, which are rarely ſeen. May be tamed. There is a variety in Peru, which has a long tail; has black about his plumage; his creſt leſs complete. Theſe might be thought the repreſentatives of our poultry in America; but that there are others, which, though leſs, reſemble them cloſer by the comb and tail, as well as general figure.

THE AGAMI

INHABITS mountains and high woods, like the partridge, and pheaſant: is about two feet long; his bill reſembles the cock kind; his tail ſhort, not beyond the wings when cloſed, but overſhot by the

back feathers; legs five inches, ſcaly; head, throat, and neck downy; the front of the neck ſplendid; the back, and back of the neck black; the lower part of the back browniſh-red; the reſt black, as alſo the wings and tail; the legs greeniſh.

This bird is ſingular, by its power of making a noiſe, dull and deep, not unlike the cooing of pigeons; which has always been thought to proceed from the anus, but which rather may be ſuppoſed to be a particular motion of the lungs, whoſe ſound is heard through the fleſh: this *tooo tooo* he repeats ſeveral times, and often, when urged by the imitation of it by by-ſtanders.

Are cleanly birds, dreſs their feathers with their bills, leap and beat their wings freely. Eat grain, little fiſh, bread, &c. Attach themſelves like a dog to a maſter, and diſtinguiſh him, leap upon, to ſalute him, *trumpeting* (as ſome call it); runs to meet him when returning home; at home careſſes him, and if he ſuppoſes a rival, drives him off; will peck the negro ſervants on the legs, when they approach his maſter; obeys the voice of his maſter; loves to be ſtroked and ſcratched on his head and neck; comes to table without being called; drives off all the cats and dogs before he begins to eat; never runs away, but avoids the blows of his adverſaries by flying up, and falling on them. May be taught like a dog to guard, and to guide a flock of ſheep. Follows his maſter out of town, and returns with him. They often follow ſomebody to whom they take a liking, will ſeek and find him out, and wait at a door two or three hours till he comes out; run if he runs, and ſtop if he ſtops. Some will attend ſtrangers into the garden of a houſe, and walk with them in every turn and alley.

When wild, go in troops from ten to forty, fly little, but run much, and ſwiftly. Neſtle at the foot of ſome great tree, where they make a hole, but no neſt: lay ten to ſixteen eggs: the young keep their firſt down longer than chicken, &c. till ſometimes it is two inches long, and they ſeem like beaſts covered with hair. The young are not bad eating, the old ones dry.

THE

THE

GROUS, AND ITS AFFINITIES.

THE Cock of the Wood, or larger GROUS, reſembles a cock in form, in bill, in the red ſkin over his eyes, and in the ſingularity of his feathers which grow two together; but has neither wattles nor ſpurs. His legs are feathered, and his toes ſomewhat indented. His tail is expanſible like the turkey's.

Is chiefly fond of a mountainous and wooded ſituation, in temperate climates; but in Hudſon's Bay he prefers the plains. In winter he reſides in the darkeſt receſſes of the woods; in ſummer he ventures from his retreats, to make ſhort depredations on the farmer's corn. As he is greatly ſought after, he is always on his guard, and ſeldom ſurpriſed. Thoſe who would take him, muſt venture up to his native retreats. When in the foreſt, attaches himſelf principally to the oak and the pine-trees; the cones of the latter ſerving for his food, and the thick boughs for an habitation. Sometimes will ſtrip one tree of its cones, before he will deign to touch thoſe of another. Feeds alſo on cranberries, and ants' eggs, which ſeem a high delicacy to all birds of the poultry kind.

During February, March and April, this bird is ſeen at ſun-riſe and ſun-ſet, extremely active, on one of the largeſt branches of a pine-tree. His tail raiſed and expanded; his wings lowered; he walks backward and forward, his neck ſtretched out, his head ſwollen and red, and making a thouſand ridiculous poſtures: his cry, upon that occaſion, is a kind of loud exploſion, which is inſtantly followed by a noiſe like the whetting of a ſcythe, which ceaſes and commences alternately for about an hour, and is then terminated by the ſame exploſion. All this time, the bird ſeems deaf and inſenſible; even though fired at, he continues his call; and this is the opportunity ſportſmen generally take to ſhoot him. At all other times, he is timorous and watchful; but now he ſeems entirely abſorbed by his inſtincts. This extraordinary cry, which is accompanied by a clapping of the wings, is no ſooner finiſhed, than the females hearing it, reply, approach, and place themſelves under the tree, from whence the cock deſcends. One cock will engroſs the females of a conſiderable diſtrict.

The female is much leſs than her mate, and entirely differs in plumage, ſo that ſhe might be miſtaken for a bird of another ſpecies: lays ſix to nine

nine eggs, white, marked with yellow; larger than a common hen's egg: ſhe generally lays them in a dry place and a moſſy ground, and hatches them without the company of the cock. When ſhe is obliged, during the time of incubation, to leave her eggs in queſt of food, ſhe covers them up ſo artfully, with moſs or dry leaves, that it is extremely difficult to diſcover them. She often keeps to her neſt, though ſtrangers attempt to drag her away.

As ſoon as the young are hatched, they run after their mother, though ſometimes not entirely diſengaged from the ſhell. The hen leads them into the woods. They are hardy, and their food is plentiful; but their numbers are thinned by rapacious birds and beaſts of every kind; and ſtill more by their own conteſts. The brood follows the mother a month or two; at the end of which the young males entirely forſake her, and keep in harmony together till the beginning of ſpring: then they conſider each other as rivals: they fight like game-cocks; and are ſo inattentive to their own ſafety, that often two or three are killed at a ſhot.

The BLACK COCK, is greatly ſimilar to the foregoing in form and manners; but is much ſmaller, not weighing above four pounds; is almoſt black (the hen grey), and has a kind of forked tail, flat, and divided in the middle, the ends turning outward. They deepen in blackneſs gradually; and gradually acquire, as they become old, a number of white ſpots on their tail. Sometimes eats ſcarce any thing during two or three months in winter.

There is alſo a black cock, whoſe tail is not divided, but full.

Another kind, native of Courland, changes colours with the ſeaſon. Male and female are alike; do not perch upon trees.

Of much the ſame general habits are the RED COCK of Scotland, that of the Alps, and the Ptarmigan: all may be known by the ſcarlet-ſkin above the eyes.

THE PARTRIDGE, AND ITS VARIETIES.

OF Partridges are two kinds; the grey and the red. The red is the largeſt of the two, and often perches on trees; the grey, which is common in England, is moſt prolific, and always keeps on the ground. Is found in every country, and in every climate; ſeems to adapt itſelf

horny excreſcences equal in dimenſions: theſe birds are the ſize of a turkey-hen. We ſhall deſcribe one which may convey a good idea of the whole kind.

He was the ſize of a raven, about two feet and a half long from bill to tail; his bill eight inches long, two inches wide, a little curved: a kind of ſecond bill ſurmounted the firſt, following its courſe; this reached to within two inches of the point of the bill, riſing two inches and a quarter; the height of bill, and excreſcence together (in the middle), full four inches; this excreſcence has much the look of a ſecond bill, but cloſed, yet ſhewing a mark where it might almoſt be thought to open, running down the midſt of it; this does not join the cranium, but a kind of forehead void of feathers, covered with a ſkin, through which paſſes the nouriſhment of this falſe beak. The true bill terminates in a blunt point, is of a horny ſubſtance, almoſt oſſeous; the falſe bill very thin, and yielding to the fingers, is within cellulated like a honey-comb, is black at its termination, has a black line at its origin, as alſo at the root of the true bill, the reſt yellowiſh white; the interior of the bill and palate black; at its root is a white folded ſkin on each ſide. The eye is red-brown; the head reſembles that of the jay. In general, the appearance of this calao was a mixture of the jay, the pie, and the raven. His head and neck were black; he could elevate his tuft like the jay. His back and wings black, with feeble reflections of violet and green; on ſome of his wing-feathers irregular borders of brown; the ſtomach and belly dirty white; feet black, thick and ſcaly; nails long, but not ſharp. Leaped with both feet without walking, like the jay and pie; when repoſed held his head backward. Eat fleſh as well as fruits; incapable of bearing cold. The whole tribe are ignoble, and ſome filthy, living on carrion; yet they are kept by the Indians to chaſe rats and mice, which they ſwallow whole, for they cannot tear or divide with their bill.

As the bill is the moſt remarkable diſtinction of this bird, as alſo of the Toucan, he may properly be followed by that bird.

THE TOUCAN

IS about the ſize of, and ſhaped like, a jack-daw, with a large head; its bill, from the angles of the mouth to its point, is ſix inches and an half; its breadth, in the thickeſt part, exceeds two; its thickneſs near the head is one inch and a quarter; it is a little rounded

along the top of the upper chap, the under-ſide being round alſo; the whole bill extremely ſlight, and little thicker than parchment. The upper chap is of a bright yellow, except on each ſide, which is a fine ſcarlet; as is alſo the lower chap, except at the baſe, whch is purple. Between the head and the bill is a black line of ſeparation all round the baſe of the bill; in the upper part of which the noſtrils are placed, and are almoſt covered with feathers. Round the eyes, on each ſide the head, is a ſpace of bluiſh ſkin, void of feathers, above which the head is black, except a white ſpot on each ſide joining to the baſe of the upper chap. The hinder part of the neck, the back, wings, tail, belly, and thighs, are black. The under ſide of the head, throat, and the beginning of the breaſt, white. Between the white on the breaſt, and the black on the belly, is a ſpace of red feathers, in the form of a new moon, with its horns upwards. The legs, feet and claws, are of an aſh-colour; and the toes ſtand like thoſe of parrots, two before, and two behind.

Is harmleſs and gentle, eaſily made tame, even to ſit and hatch in houſes. Feeds chiefly on pepper, which it devours greedily, gorging itſelf ſo much, that it voids it crude and unconcocted: and this the natives prefer. Grapes, being plucked off ſingly, and thrown into the air, it will dexterouſly catch before they fall to the ground. Its bill being very light, and ſo thin, as eaſily to bend by a ſlight preſſure with the fingers, has little ſtrength, nor can it peck or ſtrike ſmartly therewith. Its tongue ſeems to aſſiſt its efforts; is long, thin and flat, and often extends five or ſix inches from the bill; of a fleſh colour, remarkably fringed on each ſide with very ſmall filaments, exactly reſembling a feather; and is ſaid to be truly a feather.

Builds its neſt in holes of trees, which have been previouſly ſcooped by ſome ſtronger bill; lays two eggs, leaving only a hole large enough to go in and out at. There it ſits, with its great beak, guarding the entrance. Found in the warm climates of South America, where it is in great requeſt, for the delicacy of its fleſh, and the beauty of its plumage. Is erratic, go in troops of eight or ten, fly badly, frequent marſhes where the ſofter fruits grow; though lively they ſeem heavy, and though active awkward, becauſe of the prodigious overbalance of their bill. They are ſo fearful of cold, that they make a kind of warm bed of herbs, &c. for the nights, in the hotteſt climates. There are ſeveral varieties.

The ARACARI is a toucan, ſmaller, of leſs beak, and its ſubſtance harder.

OF

Of the MAGPIE and its AFFINITIES.

THE Magpie is the chief of this kind with us, and is well known. Its black, white, green and purple, the rich and gilded combination of gloſſes on its tail, equal any that adorn the moſt beautiful of the feathered tribe; but it is vain, reſtleſs, loud, quarrelſome, intruſive, and miſchievous.

The magpie reſembles the butcher-bird in its bill, which has a ſharp proceſs near the end of the upper chap, in ſhortneſs of wing, and form of tail, each feather ſhortening from the two middlemoſt; ſtill more in its food, living not only on worms and inſects, but on ſmall birds when they can be ſeized; a wounded lark, a young chicken ſeparated from the hen, and ſometimes a black-bird: has been ſeen to attempt a crab, whoſe pincers were however too ſharp for it. Is capable of being trained for the chace, eaſily becomes familiar, and even imperative; has been known to paſs days and nights among a troop of cats, and to make its part good. Is capable of being taught to ſpeak, and takes pleaſure in it; ſtudies its words, rejoices after the acquiſition of new ones, and is vexed when they are too difficult. Often perches on the back of an ox or a ſheep, pecking up inſects, chattering, and ſtretching out its neck for combat; ſeeks out alſo the neſts of birds. Nothing ſeems amiſs; it ſhares with ravens in their carrion, with rooks in their grain, with the cuckoo in eggs; and when it is ſatisfied for the preſent, lays up the remainder. Even when tame will hide its food when filled, and after a time return to its hoard with renewed appetite and vociferation.

Its neſt is not leſs remarkable for artful conſtruction, than for ſecurity of ſituation. The place is always difficult of acceſs. The body of the neſt is compoſed of hawthorn branches; the thorns ſticking outward, but well united by mutual inſertions. It is lined with fibrous roots, wool, and long graſs, and nicely plaiſtered with mud and clay. A canopy defends it above, compoſed of the ſharpeſt thorns wove together, and denying all entrance except at the door, which is juſt large enough to permit egreſs and regreſs to the owners. The magpie lays ſix or ſeven eggs, of a pale green colour, ſpotted with brown. Watches its neſt very cloſely, and defends it valiantly. If it obſerves a man has handled its eggs, tranſports them elſewhere in its claws for ſafety. The young are blind, and barely perfect; the mother maintains them with much tenderneſs. Lives twenty years.

The fowlers ſay, that if ſhe obſerves a man enter a hut at the foot of the tree where her neſt is, ſhe will not viſit her neſt till he is gone. If two enter the hut, ſhe watches both out; the ſame for three, or four; if ſix enter, and five come out, ſhe is contented, and forgets the ſixth.

To this tribe we may refer the JAY, which is one of the moſt beautiful of the Britiſh birds. The forehead is white, ſtreaked with black; the head is covered with very long feathers, which it can erect into a creſt at pleaſure; the whole neck, back, breaſt, and belly, are of a faint purple, daſhed with grey; the wings are moſt beautifully barred with a lovely blue, black, and white; the tail is black, and the feet of a pale brown. Feeds upon fruits, will kill ſmall birds, and is extremely docile. Very petulant, lively, and quarrelſome, even to forgetting ſelf-ſecurity; for they will fight over branches, and ſometimes are ſtrangled by being caught by the throat between two. In cages they beat themſelves to pieces. Neſtle in woods far from habitations, preferring old oaks grown over with ivy. Often, in attempting to ſteal birds caught in ſnares, are themſelves caught. There is a white jay which yet retains the blue on his wings. The Rind is ſpread in diſtant parts.

The CHATTERER, native of Germany, may be placed in this rank; is a wandering bird; ſometimes in ſuch numbers as to darken the ſun; is ſomewhat leſs than the former: is tufted, and variegated with a beautiful mixture of colours; red, aſh-colour, cheſnut, and yellow: but what diſtinguiſhes it are horny appendages at the tips of ſeven, ſometimes eight (or more) of the leſſer quill-feathers, which ſtand bare of beards, and have the colour and gloſs of the beſt red ſealing wax. Feeds on berries and grapes; is very cleanly.

The ROLLER is not leſs beautiful. The breaſt and belly blue; the head green; the wings variegated with blue, black, and white. Is diſtinguiſhed by a ſort of naked tubercles or warts near the eyes. Is a bird of paſſage, ſomewhat rare; inhabits Germany; dwells in thick woods; is quite wild; feeds on grain, &c. are good eating in autumn. The Arabian *Shaga-rag*.

The NUTCRACKER is a German bird, living on the mountains, and whoſe manners are little known; there are two races. They do much miſchief among the trees, and lodge in them like the woodpecker. Every fifteen or twenty years come in flocks, or rather armies (like the Leming of Lapland), and devour much of the harveſt.

OF THE

WOODPECKER AND ITS AFFINITIES.

LIVE chiefly on inſects contained in the bodies of trees; for this purpoſe have ſtraight, hard, ſtrong, angular, ſharp bills, fit for piercing and boring. Tongue long, round, ſharp; dentated legs, ſhort and ſtrong; four thick, ſtrong, nervous toes, ſtanding two forward, and two backward; one of which is remarkably ſtrong; all have very ſtrong and crooked nails, which are particularly ſerviceable in holding by branches of trees. They have ſtiff hard tails, to lean upon when climbing; the feathers of which end more or leſs *ſharply*, and which contribute to *fix* them; for they often paſs a whole night in the attitude of ſtriking, and ſleep while ſo ſituated.

Of this bird there are many kinds, and many varieties in every part of the world. They differ in ſize, colour, and appearance; the largeſt equal a crow, the ſmalleſt a thruſh. Are moſt numerous in warm climates.

The Green WOODSPITE, or WOODPECKER, is called the Rain Fowl in ſome parts of the country; becauſe, when it makes a greater noiſe than ordinary, it is ſuppoſed to foretel rain (the ancients thought it ominous). Is about the ſize of a jay; the throat, breaſt and belly are of a pale greeniſh colour; the back, neck, and covert feathers of the wings green. The tongue is its diſtinguiſhing characteriſtic.

Feeds on inſects; particularly on thoſe which lodge in hollow or rotten trees. Theſe it procures by its tongue. This is round, ending in a ſtiff, ſharp, bony tip, dentated on both ſides, like the beard of an arrow; this it can dart three or four inches out from the bill, and draw in again at pleaſure. Thus its prey is transfixed, and drawn into the mouth. When a wood-pecker has found a rotten hollow tree where there are worms, reſting by its ſtrong claws, and leaning on the thick feathers of its tail, it begins to bore with its ſharp ſtrong beak, till it diſcloſes the internal habitation; then it ſends forth a loud cry, which terrifies the whole colony; while they creep hither and thither, ſeeking ſafety, the bird feaſts on the whole brood. Sometimes alights on the ground, to try its fortune at an ant-hill, which it pecks, in order to call the inhabitants abroad; then thruſts out its long red tongue, which being like a worm,

worm, the ants come out to ſettle on in great numbers: the bird withdraws its tongue at a jerk, and devours the devourers.

The woodpecker chooſes, however, for its neſt, trees that are decayed, or wood that is ſoft. In theſe, it makes deep holes exactly round, but often makes twenty before one is found to give ſatisfaction. Of thoſe it deſerts, other birds, not ſo good borers, and leſs delicate, take poſſeſſion; the jay and the ſtarling often, and ſometimes bats. Its eggs are depoſited in the hole, without any thing to keep them warm, except the heat of the parent's body. Their number is generally five or ſix; white, oblong, and of a middle ſize. When the young are excluded, and before they leave the neſt, they are adorned with a ſcarlet plumage under the throat, which adds to their beauty.

THE CREEPERS

ARE a numerous family, ſpread in various parts of the world, which creep along the trees, upwards or downwards; and along the branches, over them or under them; they alſo run very nimbly along beams, &c. in houſes. Many of them reſemble the titlarks; others the colibris, by their beautiful plumage. They live intirely on inſects, but are unable to bore for their prey as the woodpecker does; they follow, therefore, thoſe who are able to pierce the wood, and take the prey they meant for themſelves; or are content with ſuch inſects as wander from their retreats, which, in the warmer climates eſpecially, are not a few.

The creeper is about the ſize of a wren, extremely active and mobile; inhabits the hole of a tree, whence he iſſues to ſtrike the inſects of the bark and moſs. Here ſhe breeds; lays five to ſeven eggs.

The WALLCREEPER inhabits walls; there lodges, creeps, and lays. Inhabits rocks alſo, and church-yards; flies, ants, and eſpecially ſpiders, are their food.

At the Cape of Good Hope, the Dutch maintain many of the creeper kind, by giving them ſugared water: the flies, &c. (which are the plague of the inhabitants) ſupply the reſt; they die if fed on any other food than inſects.

THE

THE HOOPOES.

THE Hoopoe is diſtinguiſhed by a double aigrette, or creſt, which is almoſt peculiar to himſelf (or reſembled only by the Cockatoo), by his long bill, thin and curved, and his ſhort feet; about equal to the thruſh in ſize; belongs to the old continent. One of theſe birds, taken when full grown, became ſo attached to its keeper, as to be jealous of the preſence of ſtrangers, and to ſet up his tuſt; was always with his miſtreſs, could not bear ſeparation, nor was he deſirous of liberty. Was ſo fond of muſic, as to ſtand on the harpſichord ſo long as his miſtreſs played. Eats inſects; follows the courſe of the Nile in Egypt for this purpoſe; in Europe are birds of paſſage; neſtle in the holes of trees, or in walls; their neſts filthy, lay two to ſeven eggs.

THE PROMEROPS

GREATLY reſembles the Hoopoe; has no creſt, but two frizzled tufts of feathers on each ſide the body, compoſed of nine long feathers, which are capable of elevation, as are alſo ſome of the ſcapulary feathers, which, when raiſed together, aſſume the form of a fan; theſe being ornamented with brilliant green, and changeable blue and violet, give a ſort of garland-like appearance to the wings. From theſe frizzled feathers, originate on each ſide a dozen or fifteen long feathers, which have the ſame reflections. The head and belly are green, the reſt chiefly black; bill and feet black; tail very long. One ſpecies is orange-coloured.

THE BEE-EATERS

ARE ſo named from their food; not that they eat only bees, for they devour waſps, and other flying inſects, which they chaſe much like ſwallows. The children in the iſle of Candia uſe ſuch inſects for baits for them, and *fiſh* for them by lines hung in the air, on preciſely the ſame principles as baits are uſed for fiſh; the bee-eater ſwallows the inſect, and is caught by the hook. Sometimes eat grain; they perch on fruit trees, and dart on their prey; lay in holes, which, with their ſtrong and ſhort

feet, and iron bills (as the Sicilians call them), they make ſix feet deep in ſoft ground. About the ſize of a thruſh. The kinds are numerous.

THE FLY-CATCHERS

ARE among the moſt uſeful birds of prey; for ſuch they truly are, as they live only on inſects. This kind is extremely numerous in ſpecies and varieties. The larger are equal in ſize to the butcher-bird, the ſmalleſt to the black-bird. They have a ſtrong bill, almoſt triangular (ſurrounded with *whiſkers*), and little hooked, in ſome kinds, at the end; in the larger kinds conſiderably bent; tail long. Wild and ſolitary; they inhabit great trees; rarely deſcend to the ground. The climates of the ſouth, where the inſects abound, are their true countries. Only two kinds known in Europe; but in Africa we count eight, and in America thirty; where alſo are the larger kinds.

The European fly-catcher is under ſix inches long, plumage grey, white, and deepiſh aſh-colour; comes in April, goes away in September. Lives in woods; wild and ſtupid; build their neſts expoſed. In America ſome of the kinds are but the ſize of a wren; others are powerful birds.

Without the aſſiſtance of theſe birds, diminutive as ſome may ſeem, every endeavour would be vain to overcome and drive away the clouds of flying inſects which are a perpetual annoyance; they are too numerous to be deſtroyed; are conſtantly ſtinging men and cattle, devour the productions of the ground; infect, by their excrements or their eggs, all proviſions, &c. intended for ſtores; no candle can be lighted, but their numbers extinguiſh it; no ſleep can be obtained without the utmoſt care to exclude them, which often is inſufficient. To theſe birds, therefore, we are under great obligations; and nature has encreaſed the devourers, where ſhe has multiplied their prey.

THE ANT-EATERS

FORM a remarkable claſs of birds: they abound in the humid and low countries of South America, where inſects and reptiles, by their numbers, tyrannize over all other ſpecies of creatures.

In Guyana and Braſil, the ant-hills are the ſize of hay-ſtacks, and at leaſt

leaſt as populous as our own ant-hills; nor are theſe hills rare, but exceed ours in number, as in bulk, perhaps an hundred to one.

To prevent the total devaſtation which theſe animals might create, nature has appointed not only quadrupeds, but birds, to leſſen their numbers. Theſe birds are not totally unlike our black-birds in figure, but have ſhort tails and wings; they perch but little, but run on the ground like partridges; go in troops; are generally found on ant-hills twenty feet high; are of a larger and ſmaller ſpecies, but greatly alike; keep in woods. The largeſt of the kind has been named King of the Ant-eaters, becauſe there is ſeldom more than one of this kind among a troop of others, which he ſeems to avoid from dignity; is leſs lively than the others; the female (as throughout the ſpecies) larger than the male.

That called the Béfroi, though in ſize but ſix inches, has a voice (which he exerts morning and evening) as ſtrong as a bell ſounding the alarm, and may be heard at above a mile diſtance. The *ſtrokes* follow rapidly, for an hour together, in all ſeaſons.

That called the Chimer (*carrilloneur*) generally goes in companies of four or ſix: their clamour has exactly the effect of a ſet of three bells chiming alternately; their voice is loud, but not equal to the foregoing: whether each has three tones, or there are different tones of voice among them, is uncertain.

THE WRY-NECK

IS a bird, whoſe ſingular manners merit attention, and are juſtly expreſſed by his name: he is diſtinguiſhed by a habit of turning and twiſting his neck, bringing his head over his back, and half ſhutting his eyes; this movement is not rapid, but ſlow and gradual; it ſeems to be the effect of affright and aſtoniſhment at the ſight of an object whoſe novelty ſurpriſes him, or to be an attempt at ſelf-defence when he is ſeized; yet, as the young in the neſt have the ſame habit, it may rather be thought a conſequence of ſome natural conformation. One of theſe birds taken and caged, when viſited, looks ſteadily at the ſpectator, then raiſing himſelf on his feet, pokes himſelf ſlowly forward, elevating the feathers on the crown of his head, ſpreading his tail; then ſuddenly withdrawing himſelf, ſtrikes with his bill the bottom of his cage, and depreſſes his tuft; this he repeats an hundred times running. Upon

theſe oddities, ſuperſtition adopted this bird in inchantments, and preſcribed it as the moſt powerful of philtres; but where any analogy of cauſes and effects could be ſuggeſted, is utterly inconceivable. The wry-neck is not numerous; comes over in May, returns in September; is ſolitary; feeds on the ground; is the ſize of a lark; plumage grey, black, and tan-colour, waved and banded, producing a rich effect, not unlike a ſnipe's, eats ants like the woodpecker.

The ſtrange motion of her neck has often protected her neſt; for it reſembles ſo ſtrongly that of a ſerpent, that many a bird-neſter has refrained from plunder, terrified by this ſuppoſed dangerous menace.

THE ANIS

ARE birds of manners ſo ſocial, that they not only fly in flocks, but ſeveral females ſit and hatch on the ſame neſt. They have many nick-names, as Devil's-bird, Tobacco-ſtalk, &c. in the Weſt Indies.

They have two toes before, two behind, ſhort bills crooked, thicker than large; the inferior mandible ſtraight, the ſuperior ſemi-circular, hooked at the end. About the ſize of a thruſh; ſome larger; colour, black, or deep brown-black.

The neſt is made large; conſtructed of dry ſticks and twigs, ſo as to hold five or ſix birds, and enlarged according to the number of ſitters, ſometimes to eighteen inches wide. They build together, breed together, fly together, perch together as cloſe as poſſible, whiſtle together, and feed together; eat grain, alſo reptiles and inſects. They fly badly, and hurricanes often deſtroy numbers: if their eggs are mixed, they hatch each one the others', nor do they refuſe ſuſtenance to their neighbours young; cover their eggs with leaves; and often one ſits while the others are building around her. Are not eatable.

THE OX-PECKER

IS a ſmall bird, about the ſize of a lark, of a grey-brown colour, which is very fond of the *larvæ* of certain inſects which breed under the epidermis (or upper ſkin) of oxen, and which live there till their change. He ſtands on the back of the animal, and, by ſtriking with his bill, opens the place where the inſects are whereon he feeds. Inhabits hot climates.

IN

IN the foreſts of hot countries, among the firſt ſtrange objects that excite curioſity, is the multitude of birds' neſts hanging at the extremity of almoſt every branch. Many kinds of birds build in this manner; but as the chief of them are of the woodpecker kind, we ſhall here deſcribe the moſt remarkable. In theſe ſolitary foreſts, man is but ſeldom ſeen; the little bird has therefore nothing to apprehend from man; but is ſatisfied if its neſt be out of the reach of thoſe rapacious animals that live by robbery and ſurpriſe. The monkey and the ſnake *muſt* be guarded againſt, the bird has no other enemies to fear.

On one of theſe immenſe trees, is ſeen the moſt various, and the moſt inimical aſſemblage of creatures that can be imagined. The top is inhabited by monkies of ſome particular tribe, that drive off all others; lower down twine about the great trunk numbers of the largeſt ſnakes, patiently waiting till ſome unwary animal comes within reach; and at the extremes of the branches hang neſts in great abundance.

The CAROUGE of the Weſt Indies makes it of a kind of moſs, called by the Engliſh inhabitants of theſe countries *old man's beard*. It is fibrous, not unlike horſe-hair, which bears being moulded into any form, and ſuffers being glued together. This, therefore, the bird firſt glues by ſome viſcous ſubſtance, to the extreme branch of a tree; then building downward, the neſt depends in ſecurity.

The TOUCNAM-COURVI of the Philippine iſlands builds its neſt of little fibres interlaced together, ſo as to form a kind of bag, open on one ſide; to this opening is adapted a long funnel, or tube, compoſed of the ſame kind of fibres, hanging down, and opening below, ſo that the true entry to the neſt is not ſeen; theſe neſts are hung at the end of branches.

The BAGLAFECHT is an Abyſſinian bird, which rolls its neſt ſpirally, much like the ſhell of a nautilus; he hangs it at the end of a branch, almoſt always over a ſtanding water; the entrance is always turned *from* the rainy quarter, thereby guarding againſt wet, as well as enemies. To attain the ſame advantages, the GROSS-BEAK of Abyſſinia makes his neſt pyramidal, turns its opening from the rainy quarter, and alſo divides the cavity of the pyramid by a partition, forming, as it were, two chambers; the firſt, where is the entry; then he deſcends *under* his diviſion into the ſecond, where is the neſt; ſo that let the rain or wind be ever ſo violent, it cannot reach the eggs.

Some birds glue their neſt to the leaf of the banana-tree, which makes two ſides of their little habitation; while the other two are artificially compoſed by their own induſtry. Thus their neſts hang before the ſpoilers a temptation, but beyond their acquiſition.

OF

OF THE

BIRD OF PARADISE AND ITS VARIETIES.

THIS bird appears as large as a pigeon, though in reality the ſize of a thruſh. The tail is about ſix inches; as is the body; the wings are large, compared with the bird's dimenſions. The head, throat, and neck are velvetted pale gold colour; eyes ſmall; the baſe of the bill, and the ſide of the head and throat, are ſurrounded by black feathers, ſoft as velvet, and changeable by a varied incidence of light; the hinder part of the head is ſhining green, mixed with gold; the body and wings are chiefly covered with beautiful brown, purple, and gold feathers; the feet long and ſtrong; the upper part of the tail feathers are pale yellow, thoſe under them white, and longer than the upper, for which reaſon the hinder part of the tail appears all white; but what is moſt remarkable are two long naked feathers, which ſpring from the upper part of the rump above the tail, and which are uſually three feet long; theſe are bearded only at the beginning and the end; the ſhaft for two feet nine inches being a deep black, while the feathered extremity exhibits changeable colours, and an ornament ſomething like the eyes of a peacock's tail. Black is the principal colour of ſome kinds.

This bird, whoſe beauty is ſuperlative, is native of the Molucca Iſlands, but found in greateſt numbers in that of Aro, in whoſe delightful and ſpicy woods they fly in large flocks. The inhabitants give them the name of God's birds (*Manucodiata*). At night all generally perch upon the ſame tree. They are called by ſome Swallows of Ternate, from their rapid flight, and from being continually on the wing in purſuit of inſects. In the rainy ſeaſon, it is ſaid they fly to other countries where their food is in greater abundance; they have their ſtated times of return. In Auguſt, they are ſeen in great numbers flying together.

The natives, who make a trade of killing theſe birds and ſelling them to the Europeans, having concealed themſelves in a bower made of the branches of the trees they frequent, ſhoot the birds with arrows of reeds.

There is alſo a *Manucodia* which has ſix long feathers iſſuing from his head, like thoſe of others from the tail; a kind of creſt from the bill; the feathers on the belly are four inches long.

N. B. The natives *cut off* the legs of many birds they ſell, and ſay they have none.

THE

CUCKOO AND ITS VARIETIES.

THIS ſingular bird is ſomewhat leſs than a pigeon, ſhaped like a magpie, of a greyiſh colour, diſtinguiſhed by its round prominent noſtrils; the opening of its bill large; its claws two behind, two before; legs ſhort, tail long. It diſcovers itſelf early in the ſpring by its call, which is at firſt very weak, and earlier or later as the ſeaſon ſeems to be more or leſs inviting. The call of the cuckoo, as ſummer advances, improves both in frequency and loudneſs. This invitation is uſed only by the male, who, perched upon ſome dead tree, or bare bough, repeats his ſong, which he loſes as ſoon as the genial ſeaſon is over. His note is pleaſant, though uniform; and ſeldom occurs to memory, without reminding us of the ſweets of ſummer.

The female makes no neſt of her own, but ſometimes lays in holes of rocks; much oftener ſhe invades the property of ſome other bird, the water-wagtail, hedge-ſparrow, lark, or ſtock-dove, and about twenty different birds; and often, after devouring the eggs of the owner, lays her own in their place. She uſually lays but one (rarely two in the ſame place), which is ſpeckled, and of the ſize of a blackbird's. This the foſter-parent hatches with great aſſiduity, and finds no difference in the great ill-looking changeling from her own, or at leaſt treats it as her own. To ſupply this voracious creature, the credulous nurſe toils with unuſual labour, and, though forced by perpetual craving to ſupply extraordinary food for an unuſual length of time, yet continues the difficult employment.

Fleſh and inſects are their nouriſhment, meal-worm inſects eſpecially. The capacity of their ſtomach is enormous, and reaches from the breaſt-bone to the vent; it is partly membranous, partly muſcular.

They are naturally weak and fearful, as appears by their flying from ſmall birds which every where purſue them, and often drive the female cuckoo from her deſign of laying in their neſt. The young birds are brown, mixed with black; and in that ſtate they have been deſcribed by ſome authors as old ones. A female cuckoo has been found ſo like a merlin in plumage, as might deceive obſervers. It moults ſo entirely as to be naked, and in this ſtate may be miſtaken for another animal.

The cuckoo, when fledged and fitted for flight, follows its ſuppoſed parent ſome time; but its appetite for inſect food increaſing, it quits its ſuppoſed dam. The little birds of the grove ſeem to conſider the young cuckoo as an enemy; they purſue it wherever it flies, and oblige it to take ſhelter in the thickeſt branches of ſome neighbouring tree; the wry-neck, in particular, is active in the chace.

Early at the approach of winter, it diſappears, and its paſſage can be traced to no other country. Some ſuppoſe it lies hid in hollow trees or rocks, where it is ſaid to have been found naked; others, that it ſeeks warmer climates; but to what country it retires, or whether it has been ever ſeen on its journey, is unknown.

Of this bird there are many kinds in various parts of the world, not only differing in their colours but their ſize, to the amount of above thirty, of various notes, ſome far from muſical, but ſufficiently noiſy.

The *Hou-hou* of Egypt live principally (if not only) on graſshoppers; never perch on trees, or ſtand on the ground, but ſit on buſhes.

The *Cuckoo* of the Cape of Good-Hope, called *Indicator*, has the cuſtom of finding the neſts of wild bees; and giving notice, morning and night, to thoſe who ſeek the honey, he even redoubles his clamour, flies before them, and leads them on if they linger. After they have taken the hive, they always leave him a portion. The ſweets are encloſed in a hive, whoſe opening is too narrow for him by himſelf to procure them.

The *Tac-ho* of the Weſt Indies devours not only inſects, but reptiles, lizards, ſnakes, frogs, rats; ſwallow ſnakes head foremoſt, and is a bird valuable for its deſtruction of hurtful animals; is naturally half domeſtic. Its neſt has never been ſeen. Moſt of the American cuckoos build and hatch their own young.

One is entitled the *Laugher*, from the reſemblance of his note.

The Cockatoo.

OF THE

PARROT AND ITS AFFINITIES.

THE eaſe with which this bird is taught to ſpeak, and the number of words it is capable of repeating, is ſurpriſing.

Willoughby tells a ſtory "of a parrot belonging to king Henry the Seventh, who then reſided at Weſtminſter, in his palace by the river Thames, which had learned many words from the paſſengers as they happened to take water. One day, ſporting on its perch, the poor bird fell into the water, at the ſame time crying out, as loud as he could, *A boat, a boat, twenty pound for a boat!* A waterman who happened to be near, hearing the cry, made to the place where the parrot was floating, and taking him up, reſtored him to the king. As the bird was a favourite, the man inſiſted that he ought to have a reward rather equal to his ſervices than his trouble; and as the parrot had cried twenty pounds, he ſaid the king was bound in honour to grant it. The king at laſt agreed to leave it to the parrot's own determination, which the bird hearing, cried, *Give the knave a groat.*"

In their native countries the foreſts ſwarm with them. It is aſſerted by ſenſible travellers, that the natives of Braſil can change the colour of a parrot's plumage by art; if this be true, they can multiply ſpecies at pleaſure, to the evident embarraſſment of nomenclators.

Their varieties exceed an hundred: to repeat their diſtinctions, therefore, would be barrenneſs itſelf, ſince their general nature is ſimilar, and after knowledge of one or two, little novelty ariſes from the reſt.

Thoſe of the old continent may juſtly be ſeparated from thoſe of the new, and divided into the cockatoo, the parrot, the lories, long-tailed paroquet, and ſhort-tailed paroquet: thoſe of the new world divide into the mackaws, the amazons, the criks, the popinjays, the long-tailed paroquet, and ſhort-tailed paroquet.

THE COCKATOO

IS the greateſt parrot of the old world, and ſeems attached to the warmer climates of Aſia, India, and the iſlands of the Indian Ocean; their name expreſſes their cry generally. Their white plumage, and

rounded and hooked bill, diſtinguiſh them; but eſpecially a tuft on the head, which they can elevate or depreſs at pleaſure. They are not eaſily taught to ſpeak, ſome not at all; but they are eaſily tamed, and often neſtle on houſes. They ſeem the moſt intelligent of their kind; liſten, underſtand, and obey, better than moſt, and may be taught various tricks and motions; are graceful and agile. That with a white creſt is about the ſize of a hen; is white throughout, except a little yellow under the wings and on the tail; his bill and feet black; his creſt is compoſed of ten or twelve large feathers, of the nature of the wing-feathers, well bearded, placed in two lines, from back to front, and forming a double fan. In ſome the creſt is yellow; in ſome red. Some are black.

OF PARROTS

THERE are ſeveral ſpecies; ſome grey, as the jacoo, which has much docility; brought from Guinea, and the interior of Africa; imitates, by preference, the voices of children; but acquires alſo the imitations of other voices; is ſo fond of talking, that he talks in his ſleep: learns alſo to dance, but very awkwardly; loves wine, as do all parrots, and are very merry with it. There are alſo black of this kind.

THE LORIES

ARE ſo named from a reſemblance to their cry; are diſtinguiſhed by their plumage, which is red, more or leſs deep; their bill is leſs crooked, ſhorter, and ſharper, than in moſt parrots. They are lively, agile, and the only one which can leap on their ſtick if placed a foot high; are eaſily tamed, and preſerve their gaiety in captivity. Are found in the Molucca iſlands, and in New Guinea.

LONG-TAILED PAROQUETS

ARE of various colours; green with a red collar; with wings blue, yellow, and orange; ſome with blue heads; ſome green and red; and many various mixtures.

SHORT-

SHORT-TAILED PAROQUETS

ARE very numerous in Aſia and Africa; generally build their neſts at the end of branches; many of theſe are but ſmall.

MACKAWS

ARE of ſplendid plumage; purple, gold, and azure embelliſh them: they are haughty, yet may be domeſticated; are peaceful, gentle, and obedient; all belong to America; are found even in deſert iſlands. They are large birds, equal to a raven; are of four kinds, the red, the blue, the green, and the black. They have long tails, a naked ſkin of a dirty white, which ſurrounds the head on each ſide, and beneath; alſo the baſe of the inferior mandible of the bill; this is their diſtinguiſhing mark. In the middle of this ſkin are the eyes, which imparts a diſagreeable appearance to theſe birds. They live in woods, in moiſt lands, among palm-trees, on whoſe fruit they feed, and of which are vaſt foreſts in overflowed ſavannas; go in pairs, rarely in flights; ſometimes aſſemble in the morning, and are heard afar off; always cry while flying; fly the beſt of the kind; croſs open places, but never ſtay; perch on the tops of trees; if they ſeek food at a diſtance (as a league) return home at night. Neſtle in old trees, enlarging ſome hole in a rotten part; breed twice a year, laying two eggs, the ſize of a pigeon's, ſpotted like thoſe of a partridge. Male and female ſit alternately, and jointly provide for their young, nor abandon them till well grown; they are not the beſt ſpeakers among parrots; their fleſh is not bad eating; are very ſubject to the epilepſy; their diſorder is called the cramp, and is ſaid to follow their ſtanding on iron of any kind; their cages, therefore, ſhould be wholly made of wood.

THE AMAZONS

ARE named after their native country; they are diſtinguiſhed by red on the end of their wings. Their green plumage is brilliant, and even dazzling; the ſame is the yellow on their heads; they are leſs than the mackaws; are rare, and come only from Amazonia. They fly

fly in troops; inhabit both woods and mountains; ſome have red heads, ſome white, ſome are yellow.

THE CRIKS

HAVE a little red on their wings, but never on the end; their green plumage is *flat* and yellowiſh; the yellow on their heads is dull, and mixed with other colours; they are much ſmaller than mackaws, and are the commoneſt of all parrots; they are much like the amazons in manners, and both, in many reſpects, conform to the mackaws. Cotton ſeed makes theſe (and all) parrots drunk; as alſo do fumes of tobacco, which the Indians blow into their bills, in which ſtate they are leſs wild, and more manageable. Some criks are yellow-necked, ſome powdered, ſome have blue faces, ſome blue heads, and ſome violet heads.

THE POPPINJAYS

ARE leſs than the amazons, and have no red in their wings; are of various colours, yellow, red, and mottled.

The long and the ſhort-tailed PAROQUETS of the new world, are extremely various, beautiful, docile, and entertaining.

PARROTS are formed alike, their toes two before and two behind for climbing and holding; ſtrong hooked bills for breaking nuts and hard ſubſtances, on which they feed; and loud harſh voices, by which they fill their native woods with clamour. Their toes are remarkable, which appears when they walk or climb, and when eating. To climb, they ſtretch two of their toes forward and two backward; but when they feed, they bring the food to their mouths with their foot, and dexterouſly turn the greater hind toe forward, ſo as firmly to graſp the nut or fruit, ſtanding all the while on the other leg. Other animals turn their meat inwards to the mouth; whereas theſe turn their meat outwards, and thus hold the hardeſt nuts, as if in one hand, till with their bills they break the ſhell, and extract the kernel. The bill has great peculiarities, for both chaps are moveable. In moſt other birds, the upper chap unites with the ſkull;

but in theſe (and in one or two ſpecies of the feathered tribe more) the upper chap is connected to the bone of the head by a ſtrong membrane, placed on each ſide, that lifts and depreſſes it at pleaſure. By this contrivance, they can open their bills the wider, to great advantage, as the upper chap is ſo hooked and over-hanging, that, if the lower only had motion, they could ſcarce gape ſufficiently to take their nouriſhment.

Theſe birds cannot readily hop from bough to bough (their legs not being adapted), but uſe both the beak and feet; firſt catching hold with the beak, then drawing up the legs and faſtening them, then projecting the beak again, and then the feet, till they have completed their progreſs.

The tongue ſomewhat reſembles that of man; but the organs by which ſounds are articulated lie farther down in the throat, to which contributes the great motion which the os hyoides has in theſe birds.

The parrot, though common in Europe, rarely breeds here; and though it bears our winter when arrived at maturity, yet loſes both its ſpirit and appetite during the colder part of the ſeaſon, and ſeems quite changed from that buſtling loquacious animal which it appeared in its native foreſts.

A parrot at firſt obſtinately reſiſts inſtruction; but is won by perſeverance; attempts to imitate the firſt ſounds, and when it has got one word diſtinctly, the ſucceeding come with greater facility.

The parrot, called Aicurous (an Amazon), the head of which is yellow, red, and violet, the body green, the end of the wings red, the tail long and yellow, is aſſerted by Cluſius to be a prodigy of underſtanding. "A Braſilian woman had a parrot of this kind, which was the wonder of the place. As we paſſed by her houſe, ſhe uſed to call us to ſtop, promiſing, if we gave her a comb, or a looking-glaſs, ſhe would make her parrot ſing and dance to entertain us. If we agreed, as ſoon as ſhe had pronounced ſome words to the bird, it began not only to leap and ſkip on the perch on which it ſtood, but alſo to talk and to whiſtle, and imitate the ſhoutings and exclamations of the Braſilians when they prepare for battle; if the woman bid it to ſing, it ſang; if to dance, it danced. But if, contrary to our promiſe, we refuſed payment, the parrot ſeemed to ſympathize in her reſentment, was ſilent and immovable; neither could we, by any means, provoke it to move either foot or tongue."

As thoſe birds have the greateſt docility that are taken young, a neſt is conſidered as worth taking ſome trouble to be poſſeſſed of; the uſual method is, by cutting down the tree. The old are ſhot in the woods

with heavy arrows, headed with cotton, which knocks down the bird without killing it: ſome die, but others recover, and, by kind uſage and plentiful food, become talkative and noiſy.

Some of them are, particularly the ſmall paroquet tribe, delicate food. In general, whatever fruit or grain they moſtly feed on, their fleſh partakes of the flavour. When the guava is ripe, they are fat and tender; if they feed on the ſeed of the acajou, their fleſh contracts an agreeable flavour of garlick; if they feed on the ſeed of the ſpicy trees, it taſtes of cloves and cinnamon.

The paroquet kind in Braſil, Labat aſſures us, are beautiful and talkative, very tame, and appear fond of mankind; pleaſed with holding parley with a man; they never have done; but while he continues to talk, anſwer him, as if reſolved to have the laſt word.

When a fowler in purſuit of them walks into the woods, as they are green, and exactly the colour of the leaves among which they ſit, he only hears them, without ſeeing a ſingle bird; ſenſible that his game is within gun-ſhot in abundance, he is mortified to the laſt degree that it is inviſible. Unfortunately for themſelves, they are ever on the wing; for as ſoon as they have ſtripped the tree on which they ſat of its berries, ſome one of them flies to another; if fit for their purpoſe, it gives a loud call, to which the reſt reſort. At this opportunity the fowler fires among the flock while on the wing, and ſeldom fails of bringing down ſome.

On the coaſt of Guinea, parrots are conſidered by the Negroes as their greateſt tormentors. The parrots perſecute them with unceaſing ſcreaming; and devour whatever fruits they attempt to produce in their little gardens.

The green paroquet, with a red neck, was the firſt brought into Europe, and the only one known to the ancients from the time of Alexander the Great to the age of Nero. This was brought from India; afterwards the Romans found others in Gaganda, an iſland of Ethiopia.

THE PIGEON AND ITS VARIETIES.

THE tame pigeon, and its varieties, derive their origin from the ſtock-dove, the Engliſh name, implying its being the *ſtock* of the other

other domeſtic kinds. This bird, in its natural ſtate, is of a deep blueiſh aſh colour; the breaſt enlivened with fine changeable green and purple; its wings marked with two black bars; the back white, the tail near the end barred with black. Theſe ſimple tints have deviated into unlimited variety.

The STOCK-DOVE, in its native woods, breeds in the holes of rocks and the hollows of trees. All other of the pigeon-kind build in the topmoſt branches of the foreſt. But this ſoon takes to build in artificial cavities; and, excited by ready proviſion and numerous ſociety, eaſily becomes domeſtic. It preſerves its native colour for ſeveral generations.

The dove-houſe PIGEON breeds every month; but muſt be ſupplied with food when the weather is ſevere, or the fields are covered with ſnow. Lays two white eggs, which uſually produce young of different ſexes. The female ſits fifteen days, in cold weather more, relieved at intervals by the male. The intervals are uſually regulated with great exactneſs. From three or four o'clock in the evening till nine the next day, the female ſits; then the male takes his place from ten till three, while his mate is feeding abroad. If the female delays her return, the male follows, and drives her to the neſt; ſhould he in his turn be dilatory, ſhe retaliates upon him.

The young require no food the three firſt days, only warmth, which the female ſupplies entirely, nor ever ſtirs out, except for a minute's food. The old ones gather corn or grain in the fields, and keep it in their crops, from whence they throw it up into the mouths of their young, who greedily demand it.

Of all birds, for its ſize, the pigeon has the largeſt crop, which has alſo peculiar properties. Air, blown into the wind-pipe, diſtends the crop or gullet prodigiouſly. By what apertures the air thus blown enters the crop is unknown; but ſome of them (which are called croppers) can ſo much diſtend it, that the bird's breaſt ſeems bigger than its body. The uſe of the air, thus introduced, is to contribute to the ejection of the half-macerated grain contained in the crop, with which the pigeon feeds its young. The expanſive and contractive powers of the crop enable it to hold a greater quantity than otherwiſe it would, and to eject it at pleaſure. This the young receive open-mouthed; being thus fed three times a day. In feeding, the male uſually ſupplies the young female; and the old female ſupplies the young male. When well fed, the old ones do not wait the total diſmiſſion of their young; but in the ſame neſt are found young ones almoſt fit for flight, and eggs hatching.

The fidelity of the turtle-dove is proverbial; but the pigeon of the dove-houſe is not faithful. Two males often quarrel for the ſame miſtreſs; if the female admit the addreſſes of a new gallant, her old companion is diſpleaſed, abſtains from her company, or approaches only to chaſtiſe her. There have been inſtances when two males, diſpleaſed with their reſpective mates, have exchanged them, and have lived in great harmony with their new companions.

So prolific is this bird, that near fifteen thouſand may in the ſpace of four years be produced from a ſingle pair. But the ſtock-dove ſeldom breeds above twice a year; ceaſing in winter. They ſeem to have a ſtronger attachment to their young than thoſe who breed ſo often. From a ſpecies of theſe, thoſe pigeons called carriers, are produced. Theſe are eaſily diſtinguiſhed by a broad circle of naked white ſkin round their eyes, and by being of a dark blue or blackiſh colour. From their attachment to their young, theſe birds are employed as carriers. They are firſt brought from home, the letter is tied under the bird's wing, and it is let looſe. It aſcends directly into the clouds to an amazing height; then, directing itſelf by ſome ſurpriſing inſtinct towards home, ſometimes at many miles diſtance, brings its meſſage; in the ſpace of an hour and a half performing a journey of forty miles.

The varieties of the pigeon are beyond mention. Hence we have croppers, carriers, jacobines, powters, runts, turbits, and a thouſand other varieties, heightened by food, climate, and pairing, producing different ſpecies.

The RING-DOVE is larger than the former; builds its neſt with a few dry ſticks, in the boughs of trees, and maintains its native freedom, notwithſtanding attempts to render it domeſtic: for, though their eggs have been hatched by the tame pigeon in a dove-houſe, yet, as ſoon as they could fly, they always betook themſelves to the woods. In winter aſſemble in great flocks in the woods, and leave off cooing till March; neither do they coo in wet weather; is, in ſome places, a bird of ſeaſon.

The TURTLE-DOVE is ſmaller, and ſhyer, than the former; is diſtinguiſhed by the iris, of a fine yellow, and by a beautiful crimſon circle that encompaſſes the eye-lids. The fidelity of theſe birds is noted; and a pair being caged, if one dies, the other will not ſurvive it. Is a bird of paſſage; few or none remain in winter; they come late, and depart early. They fly in flocks when they come to breed here in ſummer, and delight in open, mountainous, ſandy countries. But they build in woods, and chooſe the moſt retired ſituations. Feed on grain; are fond of millet.

The

The *Peacock-pigeon* that (female as well as male) ſpreads the tail is a curious variety, has thirty feathers in the tail (others have but twelve); they advance their tail when they ſpread it, and throw back the head till it almoſt touches the tail, trembling all the time, and agitating the head and neck. The wind often acts ſo powerfully on this large tail as to daſh them to the ground.

To this liſt might be added a long catalogue of foreign pigeons, of which we know little more than the plumage and the names. The CROWN-FOWL, which belongs to the family of pigeons, is in ſize equal to a turkey; native of the iſle of Banda: in India they breed them as poultry. In America a ſpecies the ſize of a lark.

BIRDS OF THE SPARROW KIND.

THESE chiefly live in the neighbourhood of man, and among them are thoſe endowed with muſical notes. Their living near man is not the reſult of affection but of neceſſity, and becauſe inhabited grounds furniſh their chief proviſion; the deſert yields neither grain nor tender buds, nor inſects; the receſſes of the foreſt abound in enemies, not in advantages. All birds, even thoſe of paſſage, ſeem content with a certain diſtrict to provide food and ſhelter in. The red-breaſt or the wren ſeldom leaves the field to which it is accuſtomed; they mark out a territory to themſelves, on which they will permit none of their own ſpecies to encroach; but guard their dominions with the utmoſt vigilance. When food is in plenty they never wander. Some are called birds of paſſage, becauſe obliged to take long journeys for this neceſſary; but, ſtrictly ſpeaking, moſt other kinds are birds of paſſage, though their migration is leſs extenſive, either from one county to another, or from the more inland provinces toward the ſhore. Reſpecting theſe, autumn is the principal ſeaſon when the bird-catcher employs his art to entrap the wanderers, which is chiefly effected by the aid of his call-birds; theſe having moulted prematurely in a warm cage, call louder and better than thoſe that are wild: there even appears a malicious joy in theſe call-birds, to bring the wild ones into captivity. Their ſight or hearing is exquiſite; the inſtant the wild birds are perceived, notice is given by one of the call-birds, who all unite in the ſame tumultuous ecſtaſy of pleaſure, inciting the wild ones by ſhort jerks. The allurement of this call is ſo great, that the wild bird on hearing it is ſtopped in its

its moſt rapid flight. It frequently happens that if half a flock only are caught, the remaining half will immediately afterwards alight between the nets, and ſhare the fate of their companions; or ſhould only one bird eſcape, this unhappy ſurvivor will alſo venture into danger till it is caught; ſuch a faſcinating power have the call-birds.

It is not eaſy to account for the nature of this call, whether it be a challenge to combat, an invitation to food, or to courtſhip; whether their motives be gallantry or war, the ſmall birds are equally remarkable for both.

For however contemptible theſe little warriors are to larger creatures, they are often formidable to each other; and ſometimes fight till one of them yields up his life with the victory. Sometimes two male birds ſhall ſtrive in ſong till, after a long ſtruggle, the loudeſt ſhall entirely ſilence the other. During theſe contentions, the female ſits a ſilent auditor, and often rewards the loudeſt ſongſter with her company during the ſeaſon. Singing among birds is almoſt univerſally the prerogative of the male; it ſerves as a blandiſhment at firſt; as delight to her during the time of incubation; as ſecurity, to aſſure her that no danger threatens; for if danger offers, the male ſtops ſuddenly, as a ſignal to his mate to provide for her ſecurity.

Willoughby has divided the ſmaller birds into (1.) thoſe that have ſlender bills, and (2.) thoſe that have ſhort and thick bills. Thoſe with ſlender bills chiefly live on inſects; thoſe with ſhort, ſtrong bills, live moſtly on fruits and grain. Among ſlender-billed birds, he enumerates the thruſh, the blackbird, the fieldfare, the ſtarling, the lark, the titmouſe, the water-wagtail, the nightingale, the red-ſtart, the robin red-breaſt, the beccafigo, the ſtonechatter, the whinchat, the goldfinch, the whitethroat, the hedge-ſparrow, the pettichaps, the golden-crowned wren, the wren, the humming-bird, and ſeveral others of the ſparrow kind unknown in this part of the world.

Theſe ſeek and deſtroy the eggs of inſects that would otherwiſe propagate in numbers beyond the arts of man to extirpate: they know better than man where to ſeek for them; and thus at once ſatisfy their own appetites, and render him the moſt eſſential ſervices. In this tribe, we have the ſweeteſt ſongſters of the grove, the nightingale, the thruſh, the blackbird, the lark, the red-breaſt, the black-cap, and the wren.

Birds of the ſparrow kind, with thick and ſhort bills, are the groſsbeak, the croſsbill, the greenfinch, the bullfinch, the houſe-ſparrow, the chaffinch, the brambling, the goldfinch, the linnet, the ſiſkin, the bunting,

the yellow-hammer, the ortolan, the wheat-ear, and ſeveral other foreign birds, of which we know rather the names than the hiſtory. Theſe chiefly feed on fruits, grain, and corn: the harveſt often ſuffers from their depredations; but they alſo have their uſes, and are frequently the diſtributors of ſeeds into different diſtricts; and ſome are thought to thrive the better, for having undergone a kind of maceration in the ſtomach of theſe birds before they are voided. The ſongſters of this claſs are the canary-bird, the linnet, the chaffinch, the goldfinch, the greenfinch, the bullfinch, the brambling, the ſiſkin, and the yellow-hammer. Their notes are not ſo generally pleaſing as that of the former claſs, but they uſually hold it longer; and, in a cage, theſe birds are more eaſily fed, and are more hardy.

OF THE

THRUSH AND ITS AFFINITIES.

WITH the thruſh we may rank the red-wing, the fieldfare, the blackbird, the ring-ouzel, and the water-ouzel.

To this tribe may be alſo added the ſtare or ſtarling, which, though with a flat bill, too much reſembles theſe birds to be placed any where elſe.

The MISSEL-THRUSH is diſtinguiſhed by its ſuperior ſize; it differs little from the throſtle; but the ſpots on its breaſt are larger. It builds in buſhes, or on the ſide of ſome tree, ten or twelve feet high (as all this kind do); lays four or five eggs, deep blue, black ſpots; its ſong is very fine, which it begins in ſpring, ſitting on the ſummit of a high tree; ſings more than half the year; the largeſt of all birds that have muſical voices; all greater birds either ſcreaming, chattering, or croaking: feeds on inſects, holly, and miſletoe-berries; when frighted or diſturbed ſends forth a very diſagreeable ſcream; is in Burgundy a bird of paſſage; pair early; breed twice a year; ſexes cloſely reſemble; both aſſiſt in bringing up their young; live in woods; ſometimes get drunk by eating ripe grapes, and are taken by thouſands.

There is a white thruſh, which yet retains the breaſt ſpots: alſo a tufted thruſh.

The BLACKBIRD whiſtles early in ſpring, and all ſummer-time, with a note extremely pleaſing at a diſtance (being the deepeſt toned warbling of the woods), but rather unpleaſant in a cage, being too loud; lays four or five blueiſh eggs, in a neſt uſually built at the ſtump of ſome old hawthorn, well plaiſtered on the inſide with clay, ſtraw, and hair. Is more eaſily tamed than thruſhes; readily improves its ſong, and will counterfeit the human voice; love to bathe themſelves. Birds of prey are fond of their fleſh. Of the ſame kind are ſome black and white, ſome white, and ſome roſe-coloured: to avoid, therefore, the ridicule of a roſe-coloured black-bird, the claſs ſhould aſſume its old Engliſh name of ouzel.

Among the ouzels muſt be reckoned the BLUE-BIRD, which reſembles a blackbird, except in colour; it lives in the higheſt Alps (as alſo a rock-ouzel, which even there chooſes the moſt craggy rocks and the moſt frightful precipices for its reſidence); is rarely caught, but highly eſteemed in the countries where it breeds. It not only whiſtles delightfully, but ſpeaks diſtinctly; is docile, and, though waked at midnight by any of the family with a light, it will ſpeak and whiſtle. Its colour, toward winter, from blue becomes blackiſh, which re-changes to its original hue early in ſpring. It makes its neſt in deep holes, or in ſolitudes inacceſſible, not only by man, but alſo by the ſhammoy, or other wild animals: produces uſually five young; ſeldom deſcends into the plain; flies ſwifter than a blackbird, and uſes the ſame food; defends its neſt by ſtriking at the eyes of the aſſailants.

The FIELDFARE and the RED-WING make but a ſhort ſtay in this country. With us they are inſipid tuneleſs birds, flying in flocks, and exceſſively watchful to preſerve the general ſafety. Their ſeaſon of muſic and pleaſure is employed in the more northern climates, where they ſing moſt delightfully, perched among the foreſts of maples, with which thoſe countries abound. They build their neſts in hedges, and lay ſix blueiſh-green eggs ſpotted with black. Linnæus mentions a fieldfare ſo tame as to drink wine out of the glaſſes on the table; he drank ſo much as to render him bald; but being kept a whole year without wine, his feathers returned. Is a bird of paſſage, cloſely allied to the thruſh.

The STARE, or STARLING, diſtinguiſhable from the reſt of this tribe by the gloſſy green of its feathers, in ſome lights, and the purple in others, and its ſpots, breeds in hollow trees, eaves of houſes, towers, ruins,

ruins, cliffs, and often in high rocks over the ſea; its young reſemble thoſe of the thruſh very cloſely; lays four or five eggs, pale greeniſh aſh-colour; makes its neſt of ſtraw, ſmall fibres of roots, and ſuch like; and often uſes the neſts of other birds. Its voice is rougher than the reſt of this kind; but what it wants in the melody of its note, which it will learn, it compenſates by the facility with which it is taught to ſpeak. It ſpeaks equally French, German, Engliſh, Latin, Greek, not words only, but phraſes, and pronounces diſtinctly that difficult letter R. So ſoon as their young are able, theſe birds aſſemble in vaſt flocks, and feed upon worms and inſects; at the approach of ſpring, they aſſemble in fields; often fly in a troop ſo united, yet ſo agitated, and rolling on itſelf, that they embarraſs a bird of prey, which, unable to determine on any one for prey, quits the whole. They aſſemble eſpecially in evenings; paſs the night among reeds; chatter much while together; are fond of cherries; live on grain, fruit, and inſects; drink, much like the cock, and take delight in bathing. In foreign parts ſome are white, ſome black and white, and ſome grey.

To this tribe might be added above an hundred other birds of nearly the thruſh ſize, and living like them upon fruit and berries: but as it is impoſſible to deſcribe the ſplendid tints that adorn the foreign birds of the thruſh kind, paſſing theſe beautiful, but little known kinds, we advert to the American mock-bird, the favourite ſongſter of a region where the birds excel rather in the beauty of their plumage than the ſweetneſs of their notes.

The American Mock-bird is but a plain bird to the eye, about the ſize of a thruſh, a grey-brown colour, has a few ſlight breaſt ſpots, and a reddiſh (in ſome blackiſh) bill; blackiſh feet. It is poſſeſſed not only of its own natural notes, which are muſical and ſolemn, but it can aſſume the tone of every other animal in the wood, from the wolf to the raven. It ſeems even to ſport itſelf in leading them aſtray; will firſt allure the leſſer birds with the call of their mates, then terrify them with the ſcreams of the eagle. There is no bird in the foreſt but it can mimic; and there is none that it has not at times deceived.

The Indians have named it *cencontlatolli*, which means four hundred languages. Not only he ſings well, but with energy, and accompanies his voice with regular motions; he firſt riſes on his wings, then falls head foremoſt ſeveral times; then he begins dancing, and accompanies it with his ſong. If his ſong is lively, his flight deſcribes in the air a multitude of croſſing circles, mounting, deſcending, and friſking;

if his ſong is vigorous, he beats his wings in cadence; if his ſong becomes ſolemn, *piano*, and ſeemingly loſt in ſilence, he ſinks gradually down, gently hovers over his tree with imperceptible undulation of his wings, and ſettles as if motionleſs while ſuſpended in the air.

The *French Mock-bird* has breaſt-ſpots in common with the thruſh, and is about the ſame ſize; inhabits Carolina and Virginia.

THE MARTIN

IS allied to the ouzel kind in form; inhabits the Philippine Iſlands; is extremely voracious; like our pies and crows ſeeks among the hair of horſes, cows, &c. the inſects which torment them; ten or a dozen will ſometimes alight on the ſame animal; but ſhould it have any part of its fleſh bare by a ſore, the martins make free with that alſo, and become a much worſe plague than the vermin of which they rid the animal: will devour ſmall rats, and ſwallow them; are particularly fond of graſshoppers; ſettle in ſuch flocks on a tree as to cover it, ſo that ſcarce a leaf can be ſeen; brought up young among poultry, imitate their cries and motions; are of mixt colours, grey, black, and white.

OF THE NIGHTINGALE, AND OTHER SOFT-BILLED SONG-BIRDS.

THIS moſt famous of the feathered tribe viſits England only in April, and leaves us in Auguſt; is unknown in Scotland, Ireland, and North Wales. They frequent thick hedges and low coppices, and generally keep in the middle of the buſh, ſo that they are rarely ſeen. They begin their ſong in the evening, and generally continue it the whole night; for weeks together, if undiſturbed, ſit upon the ſame tree. His note is ſoft, various, and interrupted; he ſeldom holds it without a pauſe above the time that one can count twenty: this bird's muſic is more pleaſing becauſe heard when all the reſt are ſilent.

Geſner

Geſner aſſures us that it is not only the moſt agreeable ſongſter in a cage, but that it is poſſeſſed of a moſt admirable faculty of talking.

In the beginning of May, the nightingale prepares to make its neſt, which is formed of the leaves of trees, ſtraw, and moſs; it is built at the bottom of hedges where the buſhes are thickeſt and beſt covered, yet is often deſtroyed by foxes, weaſels, ſnakes, &c. While the female continues ſitting (about eighteen days), the male, at a diſtance, but within hearing, cheers the patient hour with his ſong. She lays four or five eggs, uniform greeniſh brown, of which but a part, in our cold climate, comes to maturity. The female feeds her young from her crop.

It ſleeps in the day-time, while it ſings during night, and not only ſleeps but dreams, having been heard to warble, &c. in a very low and indiſtinct manner: They bathe after ſinging, and in an evening. A male, which eſcaped from his cage, ruſhed into a fire that was near; probably being dazzled by it. Lives many years; becomes grey by age. Pliny mentions a white nightingale preſented to Agrippina, wife of Claudius, which coſt ſixty thouſand ſeſterces; little ſhort of two thouſand pounds. Is found in Perſia, China, and Japan.

The RED-BREAST, during the ſpring, haunts the wood, the grove, and the garden; retires to the thickeſt and ſhadieſt hedge-rows to breed; but in winter ſeems to become more domeſtic, and often claims protection from man: the firſt awake in the woods in a morning, the laſt at going to repoſe at night. The red-breaſt continues with us the year round, and endeavours to ſupport the famine of winter by chirping round the warm habitations of mankind, by coming into ſhelters which moderate the rigour of the ſeaſon, and where inſects are found (if at all) attracted by the ſame cauſe.

This bird breeds differently in different places: in ſome countries, its neſt is uſually found in the crevice of ſome moſſy bank, or at the foot of an hawthorn in hedge-rows; in others, it chooſes the thickeſt coverts, and hides its neſt with oak leaves. The eggs are from four to five, of a dull white, with reddiſh ſtreaks; is in ſome countries a bird of paſſage.

There is a BLUE-BREAST, which, except in that colour, little differs from the red-breaſt; lives in moiſt places; equally familiar; ſings at night. Alſo a blue-red-breaſt in America.

LARKS, whether the ſky-lark, the wood-lark, or the tit-lark, are diſtinguiſhable by the length of their heel. Their ſong is loud and pleaſing.

The

The SKY-LARK builds its neſt upon the ground, beneath ſome turf that ſerves to hide and ſhelter it. The female lays four or five eggs of a duſky greyiſh colour, ſpotted brown; ſits about fifteen days; her young are ſoon moving from the neſt: while ſhe is ſitting the male uſually entertains her with his ſinging, chiefly morning and evening; while he riſes to an imperceptible height, ſtill has his lovely partner in his eye, nor once loſes ſight of the neſt while he is aſcending or deſcending: never perches on trees; are often carried by ſtrong winds many miles out to ſea; often taken by being attracted by larking-glaſſes, a kind of mirror, whoſe brilliancy excites their attention. The cuckoo often lays in their neſts. There is a white lark, and alſo a black one. Of the tit-lark we remark that it can perch upon trees, and that the female ſings.

The BLACK-CAP and the WREN, though ſo very diminutive, are yet prized by ſome for their ſinging: the former is called by ſome the mock-nightingale; his ſong laſts longer, and he is eaſily and thoroughly tamed: the latter is admired for the loudneſs of his note, compared to the little body from whence it iſſues. The wren inhabits walls, ſtacks of wood, barns, &c. enlivening winter with his notes; his tail always erect; he hardly weighs a quarter of an ounce; lays eight or ten eggs, in a round neſt, which looks like only a ball of moſs, and thereby eſcapes notice.

The GOLDEN-CRESTED WREN is among the ſmalleſt of birds; he eſcapes eaſily through the meſhes of a net, or the wires of a cage. Nature has given him a tuft, and crown; and as moſt languages have called him little *king*, KING let him be: he is ſo ſmall that if he now appears he is inſtantly inviſible; the ſmalleſt leaf conceals him; the ſmalleſt inſects (or their larva) are his food, and ſmall worms, which he devours till he is full; active and lively, weighs one hundred and twenty grains.

OF THE

CANARY-BIRD AND FINCHES.

THOUGH, by its name, it appears that this bird came originally from the Canary Iſlands, yet we now have them from Germany, where they are bred in great numbers, and ſold into different parts of

Europe. About a century ago they were ſold at very high prices, and kept only by the great; they have ſince multiplied abundantly. In Italy and Provence are ſpecies of finches, nearly allied, and capable of breeding together.

In its native iſlands, the canary-bird is of a duſky grey colour, and ſo different from thoſe uſually ſeen in Europe, that ſome have even doubted whether it be of the ſame ſpecies: by their domeſticity they are become ſome white, ſome mottled, ſome greeniſh; but are more eſteemed for their note than their beauty; it is ſhrill and piercing, like all of the finch tribe, continuing long in one breath without intermiſſion, then riſing higher and higher by degrees, with great variety. The nightingale is the ſongſter of the woods, the canary-bird the muſician of the chamber; of retentive memory and apt imitation, he exchanges his native notes for the compoſitions of art.

More eaſily reared than any of the ſoft-billed birds (but ſubject to the epilepſy); his ſong continues throughout the year. In chooſing the canary-bird, thoſe are beſt that appear with life and boldneſs, ſtanding upright on the perch, and not apt to be frighted.

Canary-birds ſometimes breed throughout the year, but uſually pair in April, and breed in June and Auguſt; they are generally two or three days in building their neſts; the hen commonly lays five eggs, and ſits fourteen days; ſometimes the female is ready to hatch a ſecond brood before the firſt quits the neſt; then the male breeds up the young left behind, and fits them for a ſtate of independence. The female canary-bird pairs with the linnet, or gold-finch, and produces a mixed breed, like the canary-bird, and reſembling it in ſong. The ſpecies has increaſed in the Weſt Indies, and exiſts in Abyſſinia.

THE BULL-FINCH

IS remarkable for his aptneſs in acquiring, and memory in retaining, the leſſons taught him; though his native notes are harſh, yet he is capable of the moſt melodious, and this capacity is not reſtricted to the male, but belongs to both ſexes: not only he learns the airs which are taught him, but he often embelliſhes them by taſte or expreſſion, and ſeems to ſing as if prompted by ſentiment. Is capable of attachment. One that had eſcaped from its cage, after a year's liberty, returned to its

owner, and recollected her voice. Others have died when ſeparated from their maſters. In ſhort, they have an excellent memory. One which had been thrown down in its cage by ſome *blackguards*, though not ſeemingly injured at the time, ever after fell into convulſions at the approach of ill-looking people, and in one of theſe fits died, eight months after its fall. The young begin to whiſtle when able to eat alone: of four young ones, the three eldeſt, which were able to eat, fed the fourth that was unable. They are conſtant to their conſorts, the year round; have the look of attention and thought, yet are eaſily entrapped; their ſkin is very fine; their fleſh bitter or eatable, according to the fruit or grain on which they have fed; ſome of them are of paſſage; come in April, return in October.

The gold-finch learns a fine ſong from the nightingale; the linnet as well as bull-finch may be taught, forgetting the wild notes of nature, to whiſtle a long and regular tune; but his own natural ſong is pretty. He is a long-lived and healthy bird. The chaffinch offers leſs of ſong, and many of the finches have none at all; indeed ſome have neither good melody nor good manners; witneſs the following.

THE GROSS-BEAK

IS ſo named from the ſize, thickneſs, and ſtrength of his bill: it were deſirable that his character could be vindicated from the charge of ill-nature; or elſe, it is well that his numbers are but few: ſilent, ſolitary, but courageous, and boldly defending their neſts; their ſtrength of bill enables them to crack nuts and other hard ſubſtances, but alſo to deſtroy birds ſmaller than themſelves; for without a quarrel, or a word ſpeaking, they attack them by biting pieces out of them, not by ſtriking with their bill. Nearly allied in figure and manners is

THE CROSS-BILL,

WHICH alone is diſtinguiſhed by this conformity (ſome ſay deformity) of bill: the bill is croſſed ſometimes to the right, ſometimes to the left: whether this ariſes from the habit of the bird to take its food on the right or left ſide, is uncertain; the mandibles of the bill

The Crofs-bill

bill overgrowing, the points will not meet, ſo that he cannot ſtrike forward to any advantage. He feeds on the grains found in pine-apples, and is extremely dexterous in procuring them, by detaching the ſcales of the pine-apple, under which they lie. His croſs-bill alſo ſerves him in climbing, like a parrot's, and hence ſome have called him the German parroquet: they are but dull birds.

OF THE

SWALLOW AND ITS AFFINITIES.

THE GOAT-SUCKER.

THERE is nothing more unfortunate in natural hiſtory, than when a creature has obtained a name, which expreſſes falſe manners as if appropriate to it; this is inſtanced in the preſent article, which, if properly named, ſhould be entitled

THE NIGHT-SWALLOW,

As coming neareſt to its true character; yet it differs from the ſwallow by being a bird of night, by being ſolitary, by its voice, by the number of its eggs, by its laying them bare on the ground, and by its time of appearing and diſappearing. It agrees in exterior form, and much of its manners, its ſhort feet, ſmall bill and large throat, its food, and method of taking it. Lives upon inſects, eſpecially thoſe that fly by night; he chaſes in the evening twilight, for light dazzles him; he has no need to ſhut his mouth to ſecure his prey, for the inſide of his bill is replete with a kind of glue, adheſive enough to retain as well moths as beetles, and to hold them by their wings. They are ſpread in various parts of the world; many in America: any hole ſerves for a neſt; lays two or three browniſh eggs; is very jealous of her neſt's being diſcovered. Their open mouth cauſes a ſound, which in ſome parts of England procures them the name of wheel-bird, for their humming noiſe reſembles that of a ſpinning-wheel.

The Night-Swallow then is the largeſt of this kind; but its tail not forked. To this tribe belong the Houſe-Swallow, which is too well known to need a deſcription; the Martin, inferior in ſize to the former, and the tail much leſs forked; its neſt is covered at top, whereas that of the houſe-ſwallow is open; and the Swift, rather larger than the houſe-ſwallow, with all the toes ſtanding forward, in which it differs from the reſt of its kind: it comes later and goes ſooner; lays in old walls, as high as it can; makes no neſt, but lines the hole with litter: theſe reſemble each other ſo ſtrongly, that it is not without difficulty the ſmaller kinds are known aſunder; they are conſidered as friendly to man by their deſtruction of inſects; in ſome places perch in multitudes on trees during night, chooſing the branches ſheltered from the wind, which afterwards die.

They have all very large mouths, when flying always kept open; ſhort ſlender feet, ſcarce able to ſupport the weight of their bodies; and wings of immoderate length for their bulk: their plumage is gloſſed with a rich purple; their note is a ſlight twittering, which they ſeldom exert but upon the wing.

Their food is inſects, which they always purſue flying; during fine weather, when the inſects are abroad, the ſwallows are ever on the wing, purſuing their prey with amazing ſwiftneſs and agility, through their ſhorteſt turnings, its long tail like a rudder turning its moſt rapid motions.

Early in the ſpring, when the re-warming ſun begins to rouze the inſect tribes, the ſwallow is ſeen returning from its diſtant migration, and making its way feebly from other ſhores: as the weather grows warmer, and its inſect ſupply increaſes, it gathers greater ſtrength and activity; but ſometimes a rainy ſeaſon, by repelling the inſects, ſtints the ſwallow in its food; when the weather is fair, the inſect tribes make bolder flights; the ſwallow follows their aërial journeys, often ſo high as to be imperceptible. When the weather is likely to be foul, the inſects fly low; and from the ſwallow's following, we are often foretold the approaching change; often they dip in the water, in purſuit of their prey, or aquatic inſects; and in times of ſcarcity they diſpute with the ſpiders, and even ſwallow them alſo.

The ſwallow's neſt is built with great induſtry and art; particularly by the common ſwallow, which builds on the tops of chimneys; the martin ſticks it to the eaves of houſes; the night-ſwallow on the bare ground, as do the bank-martins; this neſt is built with mud from ſome neighbouring

ing brook, or ſuch as has been caſt up by worms, well tempered with the bill, moiſtened with water for better adheſion, and farther kept firm by long graſs and fibres; within it is lined with gooſe feathers.

On the coaſts of China and Coromandel, ſays Willoughby, are "a ſort of party-coloured birds, of the ſhape of ſwallows; theſe at their breeding-time come (ſome out of the country) to the rocks, and from the foam or froth of the ſea-water daſhing againſt the rocks, gather a certain glutinous matter (the ſpawn of fiſhes), of which they build their neſts; theſe the Chineſe pluck from their ſtations, and bring in great numbers to ſell; they are eſteemed great delicacies when diſſolved in chicken or mutton broth, far before oyſters, muſhrooms, or other dainty or liquoriſh morſels." This kind of ſperm of fiſhes often floats on the ſea for leagues together, in thoſe climates.

Uſually lays from five to ſix eggs, white, ſpeckled with red; ſometimes breeds twice a year. The ſwallow ſupplies her broods very plentifully, the firſt particularly; always keeps her neſt clean.

At the latter end of September, or in October, they leave us; a few days previous to their departure, vaſt flocks aſſemble on houſe tops, as if deliberating on their fatiguing journey, which is thought to be uſually to Senegal, and along the Morocco ſhore: they ſet out at night, to avoid birds of prey; always chooſe a favourable wind; the latter weakly broods, which are not yet in a condition to ſet out, delay, and are ſometimes too feeble to venture; theſe wretched little families, being compelled to ſtay, periſh in cold weather; while the tender parents ſhare the fate of their offspring, and die with their new-fledged brood. They are thought to perform their fatiguing journey in about ſeven days; when interrupted by contrary winds, in their courſe far off at ſea, they alight on whatever ſhip they find in their paſſage, ſpent with famine and fatigue, yet ſtill they boldly venture, when refreſhed by a few hours reſt, to renew their flight, and continue their courſe. They do not breed in Senegal, nor ever bring with them into Europe young of the ſame year.

Yet it remains doubtful whether all ſwallows migrate, or whether there may not be ſome ſpecies, that, though externally alike, is ſo internally diſtinct as to be very differently affected by the approach of winter. Many witneſſes affirm, that ſwallows hide in holes under ground, or in rocks or crevices, or in caverns in mountains; ſome inform us that they have ſeen them taken out of the water, and even from under the ice, in bunches. Reaumur, who particularly intereſted himſelf in this inquiry, received ſeveral ſuch accounts.

That ſome may hide in warm caverns is poſſible, but that they do not hide under water has been pretty well proved, by the noted experiment of Friſch, who tied ſeveral threads dyed in water-colours, round the legs of ſwallows, that were preparing for departure: theſe, the enſuing ſummer, brought their threads back with them, no way damaged in colour; which moſt certainly they would have been, if, during winter, they had been ſteeped in water.

Kolben ſays, that, at the Cape of Good-Hope, they are ſeen all the year; but in greateſt numbers in winter. There are many kinds, as well in America as elſewhere; in general, pretty cloſely related by form and manners.

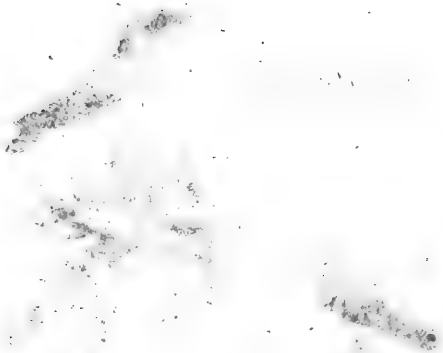
THE HUMMING-BIRD AND ITS VARIETIES.

OF all that flutter in the garden, or enliven the landſcape, the humming-bird is the moſt delightful. Of this charming little ſpecies there are varieties, from the ſize of a ſmall wren, to that of an humble-bee, ſporting in the fields of America, from flower to flower, and extracting their ſweets with its little bill. They ſeem confined between the tropics; follow the ſun to the ſolſtices, and retire with him. The Indians called them rays, or hair of the ſun.

The ſmalleſt humming-bird is about the ſize of a hazel-nut; the feathers on its wings and tail are grey-black; thoſe on its body, and under its wings, golden-greeniſh brown, with an inimitable red gloſs; a ſmall creſt on its head, green at bottom, gilded at top, which ſparkles in the ſun; the bill is black, ſtraight, ſlender, like a fine needle. Found in Braſil and the Windward Iſlands. The larger humming-bird is near half as big as the common wren, and without a creſt; is covered from the throat, half way down the belly, with crimſon-coloured feathers, that, in different lights, exhibit a variety of beautiful colours; head ſmall, with very little round eyes, as black as jet; legs and feet very ſmall, often black; ten feathers in the tail.

There are upwards of twenty kinds of humming-birds, beſide the COLIBRIS, which differ only in having the bill a little curvated, and bending

Humming
Birds
Colibri



bending throughout; of theſe are above twenty ſorts; ſome are alſo rather larger; their manners are preciſely the ſame; and knowing one is knowing both.

As ſoon as the ſun is riſen, the humming-birds, of different kinds, are ſeen fluttering about the flowers, without ever alighting on them. Their wings vibrate ſo rapidly, that it is impoſſible to diſcern their colours, except by their glittering. They ſeem actionleſs by force of their activity, continually in motion, viſiting flower after flower, and extracting its honey. For this purpoſe they poſſeſs a tongue, compoſed of two hollow grooves, forming a little canal, divided at the end; this is thruſt into the cup of the flower: upon this nectar they ſubſiſt. The rapid motion of their wings occaſions a humming ſound, from whence they are denominated. They chaſe and drive off birds twenty times their ſize. Impatience is their general character; they even tear in a pet, a flower whoſe ſweet is exhauſted. They are ſolitary.

Their neſts are ſuſpended at the point of a twig of an orange, a pomegranate, or a citron tree (ſometimes even in houſes, if they find a ſmall and convenient twig for the purpoſe); the female is the architect, while the male furniſhes materials, cotton, fine moſs, and vegetable fibres; of theſe a neſt is compoſed (about the ſize of an hen's egg cut in two), warmly lined with cotton. They lay two eggs, the ſize of ſmall peas, white as ſnow, with here and there a yellow ſpeck: the male and female ſit by turns, but the female moſt; ſhe ſeldom quits the neſt, except a few minutes morning and evening, when the dew is upon the flowers, and their honey in perfection. During this ſhort interval, the male takes her place; for the egg is ſo ſmall, that expoſing it ever ſo ſhort a time to the weather, might injure it: ſhe ſits twelve days, when the young appear, the ſize of a fly, at firſt bare; by degrees they are covered with down; and at laſt with feathers; but leſs beautiful than thoſe of their parents.

Father Mondidier, in the miſſion to America, found the neſt of a colibri in a ſhed, and took it in, when the young were about fifteen days old: he placed them in a cage at his chamber window, to be amuſed by their ſportive flutterings; but he was ſoon ſurpriſed to ſee the old ones, that came and fed their brood regularly every hour in the day. By theſe means they themſelves ſoon grew ſo tame that they ſeldom quitted the chamber; but, without any conſtraint, came to live with their young ones. All four have frequently come to perch upon their maſter's

hand, chirrupping as if at liberty. He fed them with a very fine clear paſte, made of wine, biſcuit, and ſugar; they thruſt their tongues into this paſte, till they were ſatisfied, and then fluttered and chirruped about the room; ever attentive to the voice of their maſter, when he called them. In this manner they lived with him ſix months, when he unfortunately forgot to tie up their cage to the ceiling at night, to preſerve them from the rats, and he found they were devoured in the morning.

Theſe birds, on the continent of America, at Surinam, and at Jamaica, continue the whole year; as the honey of flowers never fails them in thoſe warm latitudes: but in the Antilles, when the winter approaches, they retire, and, ſome ſay, continue torpid.

It is a doubt whether or not theſe birds ſing: Labat aſſerts, that they have a moſt pleaſing melancholy melody in their voices, though ſmall and proportioned to their organs. Some may poſſeſs agreeable voices, though the reſt may in general be ſilent.

The Indians formerly made great uſe of this pretty bird's plumage, in adorning their belts and head-dreſs. The children take them in the fields upon rings ſmeared with bird-lime: they are inſtantly killed and gutted, and hung up to dry.

Not very diſtant in nature are thoſe birds, which live only on the ſweets of the ſugar-cane; nor very diſtant in plumage, ſince the Creoles often confound them.

WATER-

WATER-BIRDS.

WATER-BIRDS enjoy at once the land, the air, and the waters; not indeed that they ſeek the land, but at a time when neceſſity impels them; nor that they wing the air, but to attain ſome ſituation otherwiſe inpracticable. The water is their abode; here they feed, they reſt, and often ſleep; and to this they train their offſpring in their earlieſt powers. Tempeſts and ſtorms are familiar to them; with the riſing and the falling billows they riſe and fall; ſport in the daſhing ſpray, and view, without alarm, the rolling gulph. Many of them traverſe the vaſt ocean, and are found hundreds of leagues from ſhore; others inhabit rocks, and are attached to the ſurrounding ſeas. Some prefer temperate climates; others (and thoſe the greater number) chooſe frozen dwellings, floats of ice, or ſhores benumbed with froſt: where not the Greenland bear, nor the morſe, nor the whale inhabits, thither retreat many kinds of birds; only diſturbed by the apprehenſion of too long night, and only quitting the extremes of the globe, as darkneſs ſpreads itſelf around their dwellings. To enjoy a few hours of light, they follow the ſun with reluctance, and with joy precede his annual viſits to their polar abodes.

Water-fowl are peaceable among themſelves, and have no tyrants of their own kind to dread; but often their chace proves dangerous, and, inſtead of taking their prey, they become victims: large fiſh draw them under water; whales, and cachalots, open the gulphs of their enormous throats, not only for ſhoals of herrings, or mackarel, but for flights of birds that follow them. Water-fowl have among them no birds of ſong; for what is melody among the waves? What the modulations of Philomel herſelf among the boiſterous roar of the agitated deep? Loudneſs and ſtrength that may be audible from afar, though leſs brilliant, are moſt uſeful.

Water-fowl are always moſt plenty where fiſh abounds; and often two ſides of an iſland ſhall be remarkable, one for the abundance, the other for the ſcarcity, of birds, from this cauſe.

Few water-fowl, in proportion to other kinds, are tamed; and thoſe which man has adopted, are rather captives than domeſtics; for being incapable of bearing confinement, they enjoy a partial liberty, if no more,

and by means of it retain moſt of the marks which belong to their native ſtate; nor do they form, by any means, the varieties and croſs breeds that land-birds do; but are capable of returning ſooner to their wild ſtate, as being leſs diſtant from it.

Between land-birds that ſhun the water, and water-fowl that inhabit it, nature has placed a numerous tribe of a middle nature, whoſe divided toes indicate a reſidence on land, but whoſe appetites attach them to the ſtreams; living among waters, yet incapable of ſwimming, their long legs fit them for wading, and their long bills for groping, in ſhallows.

Birds habituated to marſhy places, may be known by the ſcaly ſurface of their legs; moſt alſo are bare of feathers half way up the thigh; all of them above the knee; their habits of wading continually in moiſture preventing the growth of feathers on thoſe parts.

The bill of this claſs is, in general, long, and in ſome finely fluted on every ſide; its point poſſeſſes extreme ſenſibility, being furniſhed with nerves for the better feeling their food. Some have long legs, for wading; long necks, for ſtooping; long bills, for ſearching; and nervous points, for feeling. Others have long bills, but moderate legs; others long necks, but ſhort legs. Where a bird's legs are long, the neck is alſo long; no bird is ſo defective in conformation, as to ſtand upon ſtilts above its food, without poſſeſſing an inſtrument to reach it. They live on fiſh, or inſects, a few excepted; even thoſe called mudſuckers probably feed on worms.

Such are the general habits of amphibious birds. Quitting theſe for water birds, of manners truly aquatic, we come to thoſe whoſe firſt great diſtinction appears in the toes, which are webbed together by broad ſkins, ſo that they expand two broad oars to the water; and, moving them alternately, ſwim with the greateſt facility; the toes, by ſtriking backward, beat the water with their broadeſt hollow ſurface; but when advancing for a ſecond blow, their front ſurface contracts, and offers no reſiſtance againſt the fluid to impede the birds progreſs.

Web-footed birds have very ſhort legs; were the leg long, its motions would be ſlow and laborious. They have a cloſer, warmer plumage than birds of any other claſs; are alſo furniſhed with an animal-oil, that glazes their ſurface, and keeps each feather ſeparate. This oil contributes alſo to their warmth in the watry element. They abound with fat, ſo that, by the warmth of their feathers externally, and this natural lining internally, they are better defended againſt the weather, than other claſſes.

Some water-fowl prey by ſudden ſtoops from above, to ſeize what fiſh come near the ſurface; others, not furniſhed with wings long enough for flight, take their prey by diving.

After theſe hints, we divide aquatic birds into (1) thoſe of the CRANE kind, or ſuch as are amphibious, and frequent banks and ſtreams, rather than extenſive waters; (2) thoſe of the GULL kind, with long legs and round bills, that fly along the ſurface to ſeize their prey; (3) thoſe of the PENGUIN kind, that, with round bills, ſhort legs and wings, dive after their prey; (4) thoſe of the GOOSE kind, with flat broad bills, that chiefly ſubſiſt on inſects and vegetables.

The gull kind are active and rapacious, conſtantly on the wing; with ſharp ſtraight bills for piercing, or hooked at the end for holding, their fiſhy prey. In this claſs we include the albatroſs, the cormorant, the gannet or ſolan gooſe, the ſhag, the frigate bird, the great brown gull, and all the leſſer tribe of gulls and ſea-ſwallows.

The penguin kind, with wings ſhort, and bodies large, can neither run nor fly, but are formed for diving; their feet are placed ſo far backward, and their legs ſo hid in the abdomen, that the ſlighteſt ſtroke impels them head foremoſt in the water. To this claſs we may refer the penguin, the auk, the ſkout, the ſea-turtle, the bottle-noſe, and the loon.

The gooſe kind are diſtinguiſhable by their flat broad bills, covered with a ſkin; and by their manner of feeding, which is moſtly on vegetables. In this claſs we compriſe the ſwan, the gooſe, the duck, the teal, the widgeon, and their numerous varieties.

THE CRANE

IS a tall, ſlender bird, with a long neck and long legs; the top of the head covered with black briſtles, thinly ſcattered, eſpecially on the back, which thereby ſeems bald, and is red in the male; which ſufficiently diſtinguiſhes this bird from the ſtork, to which it is very nearly allied in ſize and figure. The plumage in general is clear aſh-coloured; except the tips of the wings and the head; and there are two large tufts of feathers that ſpring from the pinion of each wing. Theſe bear a reſemblance to thoſe in the ſides of the oſtrich; the quill feathers are black, and

and are finely curled at the ends; the bird has a power of erecting and depreſſing them at pleaſure. The crane varies in ſize, from three feet high, to four and even five feet, from tip of the bill to the toes. The naked part of the leg is about four inches, the feet are black, ten or eleven inches long; bill four inches, ſtraight, pointed, compreſſed on the ſides; blackiſh green in colour.

The crane is a very ſocial bird, and ſeldom ſeen ſingly; they aſſemble in flocks of fifty or ſixty; while part feed, others ſtand like centinels; ever wandering, and greatly ſubſiſting on corn and vegetables, but partly alſo on reptiles; and is known in every country of Europe (except our own), from north to ſouth; and even to Ethiopia. They generally leave Europe about the latter end of autumn, and return in the beginning of ſummer; croſſing the inland parts of the continent in flocks of fifty or an hundred, flying chiefly in the night.

In theſe journeys they aſcend amazing heights; their note is the loudeſt among birds, and is often heard in the clouds, when they are unſeen. Light for its ſize, and ſpreading a large expanſe of wing, it is capable of floating, where the air is lighteſt, in tracts too fatiguing for other birds. Though unſeen themſelves, they have diſtinct viſion of objects below; they direct their flight by their cries.

The cold arctic regions ſeem to be this bird's favourite abode; in the ſouthern parts they are rather viſitants than inhabitants.

The peculiar clangor of their voice ariſes from the extraordinary length and contortion of the windpipe; from the throat it enters through the fleſh into the breaſt-bone, which has a great cavity within to receive it; there being thrice reflected, it goes out again at the ſame hole, turns down to the lungs, and enters the body a ſecond time.

They riſe heavily, are very ſhy, and ſeldom let the fowler approach them. Their depredations are uſually made in the darkeſt nights, when they enter a field of corn, and trample it down. They chooſe ſome ſolitary marſh, where to range themſelves by day, as if in deliberation; and not having grain, wade the marſhes, for inſects and other food.

In general is a peaceful bird, both at home and abroad; is eaſily tamed, and taught poſtures and dances.

The female is diſtinguiſhed from the male, by not being bald behind; lays two eggs at a time, like thoſe of a gooſe, but blueiſh. The young ones are ſoon fit to fly, and then their parents forſake them; previouſly leading them to where their food is moſt eaſily found. Though unfledged, they

they run ſo ſwiftly that a man cannot eaſily overtake them. As they grow old, their plumage becomes darker: they are very long lived; that of Leonicus Thomeus lived with him forty years.

Their various manners of flying indicate changes in the weather; always ſet a centinel when on the earth during night; vigilant, even to a ſymbol; all (except the centinel) ſleep, the head under the wing.

White cranes are ſometimes found, but rarely.

South of the tropics are cranes, as in theſe northern parts, of the ſame appearance, and probably of the ſame manners.

In America a white crane (a conſtant race), but its great quill feathers of the wings black, is ſtronger made, larger headed, and longer billed, than the European cranes.

THE STORK

RESEMBLES the crane in bill, neck, legs, and body, but is ſomething ſmaller, and ſomething more corpulent; in colour the ſtork is gliſtering white and brown, or black on its wings; the nails of its toes are peculiar, not clawed like thoſe of other birds, but flat like the human. Feet and bill red; its long neck bent; around the eyes a naked wrinkled ſkin, blackiſh red. Rudiments of a membrane between its toes.

The ſtork is ſilent, except a noiſe cauſed by clacking its under chap againſt the upper: its windpipe has no convolution through the breaſt-bone, but is formed as uſual: preys entirely on frogs, fiſhes, birds, and ſerpents. When flying, holds forward its head ſtiff; while its legs, extended backward, are alſo ſtiff, as if ſerving for a rudder. When reſting, ſtands on one leg, its neck bent backward, and its head reſting on its ſhoulder; is eaſily familiarized, is cleanly, has a dejected aſpect, yet is often lively, and frolics with children, leaping and playing; is long lived, lives always in or near towns: lays generally four eggs, dirty white and yellow.

Are birds of paſſage; quit Europe in Auguſt; travel to Egypt, Belon ſays, in troops of four or five thouſand. Kempfer ſays they are ſtationary in Japan. All aſſemble on a particular day, and leave none of their company behind. Take their flight generally in the night: generally return in the middle of March; neſtle on the tops of chimneys and houſes, as well as of high trees: always return to the ſame neſts; if the neſt is de-

ſtroyed, build another in the ſame place. Male and female ſit upon their eggs by turns; are a month in hatching; are particularly ſolicitous for the ſafety of their young: theſe, unable to ſtand on their thin and feeble ſupports, draw themſelves along in the neſt on their knees. Belon aſſerts that they breed alſo while in Egypt.

The Dutch are very ſolicitous for the preſervation of the ſtork in their republic. This bird builds on the tops of their houſes without moleſtation, and is familiar in their ſtreets. There are few towns on the continent, in low marſhy ſituations, but have the ſtork among them.

Is ſaid to maintain its parents, when infirm by accident or age; and to give a kind of token at parting, and at returning to its neſt.

The BLACK STORK is rather brown, than black; changing by reflection to violet and golden green; a lively red ſkin round the eyes; red bill; wild and ſolitary; flies from habitations, and frequents marſhes and deſerts, or the deep receſſes of the woods. Neſtles on old trees, high pines, by the ſides of lakes; beſides fiſh, feeds on inſects; found in the Alps, and Germany; is ſuppoſed to migrate: the ſpecies is rare; ſeems to avoid where the white ſtork prefers.

The MAGUARI inhabits the hot climates of America; and ſeems to be repreſentative of the ſpecies in the new world.

The COURICACA, ill denoted by the title *wood-pelican* (ſince it has little in common with the pelican), inhabits Guyana, Braſil, and South America. In ſize equals the ſtork, higher mounted on its legs, and having a longer neck; has a hard, ſtrong, thick, and large bill: plumage brown, black, and white: his throat capable of extenſion, but nothing like the bag of the pelican. Is a bird of paſſage; frequents Carolina at the cloſe of ſummer; haunts marſhes.

THE IBIS.

THE ancient Egyptians worſhipped the IBIS, a bird in appearance between the crane and curlew; the moderns referring it to the latter kind, the ancients to the former. That man ſhould at any time, or on any occaſion, worſhip brutes, is only to be accounted for on principles heretofore hinted; and by remarking that, while ſecond cauſes were elevated to the ſtation of the great Firſt Cauſe, there were no limits whereby the influence of ſo diſhonourable and detrimental a principle could be confined.

The white Ibis

The Jabiru.

The Ibis was ſerviceable to the Egyptians, by ridding their country of ſerpents; and ſtill continues the ſervice, having particular delight in killing reptiles of all ſorts, even when ſatiated with food. There are two kinds; the black, which is very ſcarce; and the white, which is common. The white is rather leſs than the ſtork, about three feet and a half in length, legs long and naked, face and forehead without feathers, bill arched, the tips of the wings and tail black; the reſt of the plumage white; the bill is yellowiſh, roundiſh, and terminates bluntly; the head, eyes, and throat are covered with a wrinkled ſkin; the ſides of the bill are ſharp, cutting, and hard enough to cut ſerpents; which probably is the manner in which the bird deſtroys them. The legs are red, ſcaly; the nails pointed, narrow, blackiſh; rudiments of membranes; tongue very ſhort; globe of the eye ſmall.

Known to be the ancient Ibis by the bills remaining in ſome pots of mummies, and by the bones of the leg. Being held in eſteem in Egypt, frequents towns, and lives freely, wandering at pleaſure in the ſtreets. Neſtles on palm trees, and among tufts of prickly leaves, to prevent the attack of cats: lays four eggs; ſits four weeks: this relation to the four phaſes of the moon, and the black and white plumage of the bird, occaſioned it to be conſecrated to Iſis (i. e. the moon). Is long lived: the Egyptian prieſts ſhewed to HERODOTUS one which was *ſo old*, as they ſaid, *it could not die.*

The *Black* Ibis is ſmaller than the white, and not ſo long legged; in the reſt reſembling the former.

In Egypt, &c. are cranes, ſtorks, hawks, kites, and falcons, all equal enemies to ſerpents, and that devour a vaſt number. The modern ibis is not peculiar to Egypt; and ſome perſons have even thought that the true ibis is a bird of the vulture kind, called the capon of Pharaoh, which not only is a devourer of ſerpents, but will follow the caravans that go to Mecca, to feed upon the offal of the animals that are killed on the journey; of ſomewhat like which we have a hint in JOSEPHUS, though much diſguiſed, relating to the ibis: but theſe birds have not the ſame relation to Iſis, as the true ibis has, and which ſeems to fix it to the bird we have deſcribed.

THE JABIRU.

THE JABIRU is the largeſt bird of the crane kind; much higher than the crane itſelf, and double its ſize; in body exceeding the ſwan.

Inhabits the borders of the rivers Amazons and Oroonoko, where reptiles abound in prodigious numbers. Here the ſtrength of the jabiru is but proportionate to the ſize of the ſerpents which it has to deſtroy; and its height to the depth in which it has occaſion to wade. Its bill is thirteen inches long, three broad at the baſe, black, ſharp, cutting, flat on the ſides, hard as horn, ſlightly incurvated upward; the neck ſtrong, thick as a man's arm; the head, and two thirds of the neck, covered with a naked black ſkin; on the ſummit a few grey hairs. The ſkin at the bottom of the neck, four or five inches high, is of a bright red, and forms a large and handſome collar to the bird, whoſe plumage is white. Legs ſtrong, covered with black ſcales, and partly without feathers; a ſmall membrane between the toes: the tail is large, extends not beyond the wings when cloſed; inhabits marſhes and lakes; its fleſh dry, but not bad; is very fat in the rainy ſeaſon.

The NANDAPOA is a ſmaller jabiru; reſembling the former in its head and neck, but differing by its bill being arched downward, and being only ſeven inches long. The bird is about equal to the ſtork in ſize: ſummit of its head grey and bare, even bony: eyes black; ears large, and very open; wings and tail black; plumage white; fleſh good eating, after taking off the ſkin. Called the jabiru *guacu*, or large jabiru, where the former is not known.

THE KAMICHI.

THE KAMICHI, ſo called in Guyana; in Brazil, the *Anhima*; in Amazonia, *Cahuitahu*, from his cry, (which is ſo loud as to terrify into ſilence all birds and reptiles, its neighbours, as it echoes along the waters); others expreſs it *vyhoo vyhoo*; is a water-fowl, feeding on ſerpents and reptiles; bigger than a ſwan. The head, which is ſmall for the ſize of the body, bears a black bill, which is not above two inches long; the upper mandible longeſt, and a little pointed; a horn growing from the forehead, three or four inches long, ending in a ſharp point, bending forward, ſheathed at its baſe, thicker than a crow-quill, as round as if it were turned in a lathe, and of an ivory colour: the head and neck frizled, with very little feathers. At the fore part of each wing, and at the ſecond joint, ſpring two ſtraight triangular ſpurs, about as thick as one's little finger: the uppermoſt of theſe ſpurs is the largeſt, two inches long, a little bent at the end, and is ſheathed at its baſe; the hinder is ſhorter, ſheathed alſo; and both of a duſky colour. The claws alſo are long and ſharp;

general

The Kamichi.

The Secretary.

general colour brown, black, and white. Notwithſtanding theſe arms, never attacks birds, but reptiles only. Wings and tail very long; the feet covered with very ſtrong ſcales; toes very long; the middle toe, including the nail, five inches; the nail hooked, hollow beneath; toe behind reſembling that of a lark: he walks with his head high, and his neck erect. They are never found alone, but in pairs, prowling together; and their fidelity is ſaid to be ſuch, that, when one dies, the other never departs far from the carcaſe, but wanders groaning around the place, and dies with its companion. It makes its neſt of clay, at the foot of trees, on the ground, in ſhape like an oven: haunts the foreſts, but eſpecially marſhes and ſavannas, where the reptiles grow to enormous ſizes.

THE SECRETARY, OR MESSENGER,

IS among the moſt remarkable of birds, as well in form as manners; has long legs, like waders in general, yet a hooked bill like birds of prey. He ſeems to exhibit an eagle's head, on the figure of a crane. Full the height of a crane, and the ſize of a turkey-cock. On the head, neck, back, and covert of the wings, grey, inclining to brown, becoming lighter in front; wings and tail black, black waved with grey on the legs; a pacquet of long feathers, like wing feathers, hang behind his neck; moſt of them ſix inches long, black, ſome ſhorter, and ſome grey; all are ſlender near the quill, broad at their ends. The leg is almoſt bare of feathers; the toes ſhort and thick, that behind very ſtrong; nails crooked; the neck is thick, bill ſtrong, and divided beyond the eyes; the upper mandible hooked like the eagle, pointed and cutting; the eyes are placed in a naked orange-coloured ſkin, extending beyond the exterior angle of the eye, and originating from the baſe of the bill: has alſo eye-laſhes, of one row of black hairs, three quarters of an inch long, which, being a peculiarity of an extraordinary kind, contributes much to the ſingularity of the bird itſelf. Though armed by a bill proper to birds of prey, yet he is timid; and often, to elude the attacks of even a weak enemy, leaps eight or nine feet high: gentle and lively, he becomes eaſily familiar, and, when brought up young from the neſt, is domeſticated; and actually at the Cape of Good-Hope is ſerviceable in deſtroying rats, lizards, ſerpents, &c. When the bird finds a ſerpent, he attacks him by blows with his wings, to weaken him; then ſeizes him by his tail,

tail, raiſes him a great height in the air, and by repeated falls beats him to death. When running he ſpreads his wings, and is often ſeen thus running and flying at once. Neſtles in buſhes, ſome feet from the ground; lays two white eggs, with ruſty ſpots; when diſturbed, croaks; is not dangerous, but mild. He eats meat greedily, does not refuſe fiſh. When repoſing or ſleeping, crouches on his belly: ſome of his cries reſemble ſome of thoſe of the eagle. His ordinary exerciſe is to walk ſwiftly, backward and forward, a long time without ſtopping; whence his name of *Meſſenger*: as that of *Secretary*, from his feathers, as it were, ſtuck like a clerk's pen behind his ears. Diverts himſelf by throwing up a ſtraw frequently: when approached, he is fearful; but ſoon recovers his gaiety, and becomes curious. While the deſigner was drawing him, he came ſeveral times to inſpect the portrait, ſtretching out his neck, and erecting his neck feathers; often alſo ſpreading his wings: when prompted by great curioſity, erects his neck feathers very high; was never ſeen to drink; to eat at his eaſe, he half lies down; his greateſt ſtrength ſeems to be in his feet, by a blow of which he will kill a chicken, or a rat, for which he will watch aſſiduouſly before its hole; prefers living animals to dead, and fleſh to fiſh. Is but lately known at the Cape of Good-Hope; inhabits the interior of Africa: alſo the Philippine Iſlands. In ſome, the neck feathers are frizled; ſome have two long feathers in the tail, probably the male.

THE CARIAMA

SURPASSES the heron in ſize; lives on the banks of waters, and marſhes; has long feet, and naked legs, but a bill ſhort and hooked like birds of prey: carries his head high; his neck is long: at the baſe of his bill, which is yellowiſh, is a feather reſembling an aigrette; his plumage reſembles that of a hawk, being greyiſh, waved with brown. His eyes are bright gold-colour, having long black eye-laſhes; his feet yellowiſh; toes united at their origin by a partial membrane; the middle toe longeſt (nail ſhort and rounded); the hind toe placed ſo high, as not to reach the ground; heel thick and round, like that of the oſtrich. The voice of this bird reſembles that of the turkey-cock, is loud and audible from afar; his fleſh is tender and delicate; is thought not incapable of domeſtication. Inhabits South America.

THE

THE

CROWNED AFRICAN CRANE

IS pretty nearly the ſhape and ſize of the ordinary crane, with long legs and neck, but the bill ſhorter; colour of the plumage dark greeniſh grey; the bill, feet, and legs black. The head and throat form the moſt ſtriking part of this bird's figure. On the head ſtands up a compact round creſt of ſilken briſtles, flat, and ſpiraled, ſpreading every way like diverging rays, the longeſt ray about three inches and a half; on each grow, ſtanding up, very ſmall hairy feathers, black, pointed, and topped with a kind of black taſſels, which give them a beautiful appearance. A large wattle of a membranous ſkin, white on the temples, bright ſcarlet on the cheeks, ſurrounds his face, and deſcends under his bill; on his head a fine down; the eyes large and ſtaring; the iris white, the pupil black and big, ſurrounded with a gold-coloured iris that completes the bird's very ſingular appearance. Beautiful feathers of a deep leaden black colour hang down his neck, and ſpread on the ſhoulders and back; the firſt feathers of the wing are black, the others reddiſh brown; its voice reſembles the crane.

When running, ſtretches out its wings, and goes very ſwiftly, but its uſual motion is ſlow: when domeſticated, walks very deliberately among poultry, and is gentle and peaceful. At Cape Verd is half-domeſticated, and comes freely to eat grain among the poultry; is even diſpleaſed when ſolitary too long; loves to be viſited and ſpoken to. They ſeldom rooſt in houſes; but, when diſpoſed to go to reſt, perch on ſome high wall in the manner of a peacock, which bird they ſo much reſemble in ſome of its manners and diſpoſition, that ſeveral authors have called them the ſea-peacock. Has been ſuppoſed, erroneouſly, to be the Baleario crane of Pliny: neither correſponds to his hint, nor is found in the Balearic Iſlands, but inhabits the Gold Coaſt, Cape Verd, &c. Its habits and food reſemble the crane kind: loves to bathe itſelf; loves fiſh, inſects, &c.

THE NUMIDIAN CRANE.

IS vulgarly called by our ſailors the Buffoon Bird; by the French, the Demoiſelle; very cloſely reſembles the crane in figure and colours. When performing its geſticulations, after making ſundry reverences, riſes, lifts one wing, then another, turns round, ſails forward, then back again; walks with a good air and oſtentation, often bounds and leaps gaily, as if it would dance: has been called the actor, the mimic; has great vanity; loves to ſhew its feats; prefers applauſe to its food, and follows ſpectators in hopes of further inſpection. Has two tufts of fine white feathers, conſiſting of long, delicate, almoſt hairy fibres, which fall from the ſides of the head, forming a kind of head-dreſs, about four inches long; the ſummit of the head covered with long and ſoft black feathers, reclining, while the fore part of the neck is adorned with black feathers, compoſed of very fine long and ſilky fibres, that hang down upon the ſtomach, and give the bird a very graceful appearance: under the wings alſo depend long and flexible tufts of feathers. Might perhaps be naturalized in Europe, as it has lived and bred here, though a native of the Tropics.

THE SPATULA OR SPOONBILL.

THE Spoonbill differs much from the crane, yet approaches this claſs more than any other. The European ſpoonbill is about the bulk of a heron; but ſhorter in the legs. Neck furniſhed with ſmall feathers; thoſe of the back of the head fall down the neck; its eyes are ſurrounded with a naked ſkin; the feet, and naked part of the legs, are covered with a black ſkin; a partial membrane unites the toes.

Its common colour is a dirty white; thoſe of America are of a beautiful roſe colour, or crimſon, and larger than the European; its bill, which is very particular, is about ſeven inches long, and ſpreading at the end, to three times the width of the bill, terminating in a hooked point, as its name denotes; it is there upwards of two inches wide; the upper mandible ſeems to comprize the whole forehead, it is ſo large. This inſtrument in ſome is black, in others of a light grey, or yellowiſh, barred black; in thoſe of America, is red, like the body. Round the upper chap runs a kind of rim, with which it covers that beneath; within it has a long gutter, in the upper mandible; the ſubſtance of this bill is not hard, but flexible like leather; its tongue is not half an inch long, is triangular: the windpipe has a double inflection.

The Spatula *or* Spoon-bill.

The Flamingo.

Inhabits the ſides of the ſea, lakes, and marſhes; feeds on frogs, toads, fiſh, ſhell fiſh, aquatic inſects, and worms, and throws up the ſhells after digeſting the fleſh; alſo on ſerpents, of which, particularly at the Cape of Good-Hope, they deſtroy great numbers. The inhabitants eſteem them as formerly the ancient Egyptians did their Ibis: he runs tamely about their houſes; a uſeful, if not a beautiful companion.

This bird breeds in Europe, in company with the heron, in high trees; and in a neſt formed of ſimilar materials. Willoughby mentions a certain "grove, at a village called Seven Huys, near Leyden, where they build and breed yearly in great numbers. Here, alſo, the heron, the bittern, the cormorant, and the ſhag reſide, and annually bring forth together. Here the crane kind ſeem to have formed their general rendezvous; and, as the inhabitants ſay, every ſort of bird has its ſeveral quarter, where none but their own tribe are permitted to reſide. Of this grove the peaſants make good profit." It is now deſtroyed.

The ſpoonbill is very noiſy in hatching-time; lays three to five eggs, white, powdered with a few pale ſpots. The ſpecies is ſpread throughout the world, but is no where numerous.

THE FLAMINGO.

THE Flamingo is the moſt remarkable of all birds reſembling the crane, the talleſt, ſlendereſt, and moſt beautiful. The body ſcarce equals that of a ſwan; but its legs and neck are ſo long, that when erect it exceeds ſix feet high. Its wings, extended, are five feet ſix inches from tip to tip; and it is four feet eight inches from tip to tail.

Its plumage is bright ſcarlet, or flame-coloured (whence its name), ſome ſpots deeper, ſome lighter; the tips of the wings conſtantly black, their upper parts remarkably vivid ſcarlet; this colour gradually extends to the back, the rump, the breaſt, and on to the neck; the upper part of the neck, and the head, are covered with down; only the top of the head is bare of feathers.

Its bill is of a very extraordinary form, ſeven inches long, flat, and very ſtrongly turned downwards at half its length; his head and throat ſeem ſwelled to ſupport this bill, eſpecially the inferior mandible; the ſuperior mandible is rather longer than the inferior, to *include* it; the edges of both are furniſhed with a row of ſharp ſmall teeth, turning backwards; this bill is in its firſt part black, in its bent part red, but this

varies; its upper chap is ſuppoſed to be moveable. The legs and thighs are not much thicker than a man's finger; about two feet eight inches high; its neck near three feet long. The feet are not furniſhed with ſharp claws, but feeble, and partly united by ſemi-membranes; the bird is never ſeen ſwimming, its legs and thighs being ſufficient for bearing it into thoſe depths where it ſeeks for prey.

This extraordinary bird is found in Italy, Spain, all over Africa, and in America; wanders, but confines its wanderings to warm climates. In America, or where moleſted, they chiefly keep near deſerted ſhores, near ſalt-water lakes and ſwampy iſlands. They come down to the banks of rivers by day, and often retire to the mountainous parts at night; in the day they appear drawn up in a long cloſe line of two or three hundred together; and, as Dampier tells us, preſent, at the diſtance of half a mile, the exact repreſentation of a regiment of ſoldiers, or a long brick wall. Their rank is broken when they ſeek for food; but they appoint a centinel, whoſe duty is to give notice of danger, while the reſt feed. As ſoon as this truſty centinel perceives the remoteſt appearance of danger, he ſcreams, with a voice loud and ſhrill as a trumpet, and inſtantly the whole cohort are on the wing: they feed in ſilence; but now all the flock are in chorus, and fill the air with intolerable ſcreamings.

In Africa they aſſemble by thouſands, perch on the trees within and about villages and dwellings, and are very clamorous; the ſound is heard at near a mile diſtance. The Negroes conſider their ſociety as a gift of Heaven. In ſome places they are ſhot by mariners; their young, which run exceſſively faſt, are often taken with nets. When their long legs are entangled in the meſhes, they cannot eſcape; but they continue to combat; and the old ones, though ſeized by the head, will ſcratch with their claws, and often do miſchief. Of all delicacies the flamingo's tongue is the moſt celebrated; a feaſt, ſays Dampier, for an emperor! In fact, the Roman emperors thus conſidered it; and we have an account of one, who procured ſix hundred flamingos' tongues to compoſe a ſingle diſh. This tongue is larger than that of other birds, is black and griſtly; a lump of fat at its root is much admired.

Their cry ſounds like the word *Tococo*, from whence the Canadian Indians have named them. In their flight they appear of as bright a red, as a burning coal. Their manner of feeding is ſingular: the bird thruſts down its head, ſo that the upper convex ſide of the bill ſhall only touch

touch the ground; in this poſition he appears, as it were, ſtanding on its head. In this manner it paddles its feet, to attract the water, mud, &c. and their inhabitants; and moves the bill about, and ſeizes whatever fiſh or inſect happens to offer. They eat ſmall fiſhes, ſhell-fiſh, fiſh-ſpawn, and water inſects, where there are plenty. When tame, eat bread, &c. which they ſoak in water; fear cold, and come ſo cloſe to a fire as to ſcorch their legs; ſleep ſtanding on one leg, the other drawn up under the belly, the head turned back under the oppoſite wing.

Their time of breeding is according to the climate; in North America they breed in our ſummer; on the other ſide the line they take the moſt favourable ſeaſon of the year. They build their neſts in extenſive marſhes, and where ſecure from ſurprize. The neſt is raiſed from the ſurface of the pool about a foot and a half, formed of mud ſcraped up together, and hardened by the ſun, or the heat of the bird's body: it reſembles a truncated cone, or one of the pots which we ſee placed on chimneys; on the top it is hollowed out; in this cavity the female lays her eggs, without any lining but the well-cemented mud that forms the ſides of the building. She lays two eggs; and as her legs are immoderately long, ſhe ſtraddles on the neſt, while her legs hang down, one on each ſide, into the water; her body, properly ſpeaking, does not enter the neſt, but rather her rump, while her tail covers it.

The young are long before they fly, but they run with amazing ſwiftneſs: they ſuffer themſelves to be carried home, and are tamed very eaſily; in five or ſix days they become familiar, eat out of the hand, and drink a ſurpriſing quantity of ſea-water, which is indiſpenſable to them; but are not reared without great difficulty; generally pine away for want of their natural ſupplies, and die in a ſhort time. While young, their colours are very different from the lively tints of their kind. In the firſt year their plumage is white, mixed with grey; in the ſecond year the whole body is white, with here and there a ſlight tint of ſcarlet; and the great covert feathers of the wings are black: the third year the bird acquires all its beauty.

THE

HERON, AND ITS VARIETIES.

THE Heron may be diſtinguiſhed from the crane and ſtork, as well by being much leſs, as by its bill, which is much longer in proportion; but eſpecially by the middle claw on each foot being toothed like a ſaw.

Briſſon has enumerated not leſs then forty-ſeven ſorts, differing in ſize, figure, or plumage. In fact, the kind is numerous, but of uniform manners; cowardly and rapacious, indolent, hungry, exceſſively deſtructive and voracious, yet ever of lean and carrion bodies.

The common heron is remarkably light in proportion to its bulk, ſcarce weighing four pounds; yet, wings expanded, is five feet from tip to tip. Its bill is very long, being five inches from the point to the baſe; its claws long, ſharp, and the middlemoſt toothed: thus armed, yet indolent and cowardly, it flies at the approach of a ſparrow-hawk. Is very melancholy when taken old, and even refuſes food; but, if taken young, may be domeſticated.

Of all birds, commits the greateſt devaſtation in freſh-waters; ſcarce a fiſh, though ever ſo large, that he will not ſtrike at and wound, if unable to carry it away. But the ſmaller fry are his chief ſubſiſtence; theſe, purſued by the larger fiſhes, take refuge in ſhallow waters, where they find the heron a ſtill more formidable enemy. He wades as far as he can into the water, and there patiently waits the approach of his prey. "I have ſeen a heron," ſays Willoughby, "ſhot, that had ſeventeen carps in his belly; theſe he will digeſt in ſix or ſeven hours, and then to fiſhing again. I have ſeen a carp taken out of a heron's belly nine inches and a half long." Several gentlemen who kept tame herons, to try what quantity one of them would eat in a day, have put ſeveral ſmall roach and dace in a tub, and they have found him eat fifty in a day, one day with another. In this manner a ſingle heron will deſtroy fifteen thouſand carp in a ſingle half year.

In general, he is ſeen through a teleſcope, for he ſuffers no approach, but is very ſhy; fixed in his gloomy ſolitary ſtand by the lake-ſide motionleſs; his long neck uſually ſunk between his ſhoulders, his head turned on one ſide, as if eying the pool intently. Thus he ſtands early and late, and often ſo ſteady, that it ſeems doubtful whether it is an animated

The Heron

mated being; though ſometimes half frozen and covered with icicles, flies in the night, and is heard at all ſeaſons. When flying ſtiffens his legs, lays his neck on his back, folded ſo that below the bill ſeems to grow out of the breaſt; riſes very high, and flies flat. In cold or ſtormy ſeaſons, his prey is no longer within reach: the fiſh now keep in the deep, as the warmeſt ſituation; frogs and lizards alſo, of which he devours many, abide cloſely in their lurking-places; and the heron is obliged to have recourſe to patience, and to take up with water-weeds.

Often he hovers over ſhallow places, where he darts on his prey with certainty; for though the fiſh at ſight of its enemy inſtantly deſcends, yet the heron, with his long bill and legs, pins it ſecurely to the bottom, then riſes on the wing, with a trout or an eel ſtruggling in his bill: the greedy bird, however, flies to the ſhore, ſcarce gives it time to expire, but ſwallows it whole, and then returns to fiſhing as before.

Neſtles on the tops of the higheſt trees in the foreſt or the grove, ſometimes on cliffs hanging over the ſea; where they love each other's ſociety, and build in company. The female lays four large eggs of a pale green: their neſts are made of ſticks, and lined with wool: often ſeize one from the rook, the crow, or the owl, which they enlarge. Heronries are not unfrequent in France, where the fleſh of the young is in eſtimation. It was formerly much eſteemed in England, and a favourite diſh at great tables. It was even ſaid the fleſh of a heron was a diſh for a king; at preſent, nothing about the houſe will touch it but a cat.

The young are numerous, voracious, and importunate; the old ones ever on the wing to provide for them. Is very long-lived, exceeding ſixty years, but by how much is not known.

There is a *white* heron, the ſize of the former, his bill yellow, feet black. Alſo a *black* heron, a *blue* heron, and ſeveral of other colours.

The *Aigrette* is of the heron family, and diſtinguiſhed by long ſilky feathers on his back, uſed to form ornaments for the head-dreſſes of ladies, knights, and ſultans. They riſe from each ſhoulder in a tuft, which extends beyond the tail; are ſnow-white; bill and feet black; the bird about two feet high. Is found alſo in America; alſo another of double the ſize; as are ſeveral varieties of the heron kind, very large and very ſmall.

THE OPEN-BILL.

THERE is a ſtrange bird of the heron family (in ſhape at leaſt), whoſe peculiarity is denoted by his name; his bill is, in fact, *open* and *gaping* during two-thirds of its length; the upper and lower mandible equally bending outwards, leave between them a large vacancy, and only join at the tip of the bill: the bird inhabits India; has the leg and feet of a heron; his wing feathers black; the reſt of his plumage clear aſh-colour; his bill blackiſh at the root, the reſt white or yellowiſh, thicker and larger than the heron's; ſize of the bird fourteen or fifteen inches. His manners unknown.

THE BITTERN

IS famous for its ſonorous voice, which reſembles the bellowing of a bull, but hollower and louder, as if iſſuing from a cavern, or from ſome formidable enemy being reſident at the bottom of the waters; the females run to this cry, ſometimes a dozen; he ſtruts round them, and drives off intruders.

Is not ſo big as a heron, with a weaker bill of the ſame form; very deeply divided beyond the eyes; four inches long; ſhorter legs; its neck cloſely ſet with feathers, thereby ſeeming thicker; throat capable of great extenſion; bill and feet greeniſh; toes long: differs alſo in colour, which is generally paliſh yellow, ſpotted and barred with black. To produce the ſound for which it is remarkable, the lower part of its wind-pipe, at dividing into the lungs, is ſupplied with a thin looſe membrane, capable of holding a large quantity of air, and exploding it at pleaſure. Theſe exploſions are heard from ſpring to the end of autumn.

It hides in the ſedges by day, and calls in the evening, booming ſix or eight times, *bĭ-rhoud*, then diſcontinuing for ten or twenty minutes, then renewing this peculiar ſound, audible at above a mile diſtant; but only when undiſturbed and at liberty. When its retreats are invaded, it is ſilent: in domeſtic captivity, under the control of man, it is mute, and never utters this call; is incapable of attachment or inſtruction. It ſcreams generally upon ſeizing its prey, and ſometimes through fear. When attacked, defends himſelf by ſtriking at the eyes; conquers birds of

is thought to be a bird of paſſage; is rare. Lives on inſects, as well as frogs and fiſhes; hides itſelf during day, flies at night, croaking *kaw kaw*; has long toes; feet and legs yellowiſh green; bill black, ſlightly arched; eyes bright; the iris forms a red or orange-coloured circle round the pupil.

THE SAVACOU

INHABITS Guiana and Braſil; has much the ſhape and ſize of the night-raven; reſembles him alſo in manner of life, which is the ſame as the heron family; but is ſingular by his bill, which reſembles two ſpoons meeting each other by their concave parts: the upper mandible has on its convex part two *groovings*, which ſeparate the noſtrils; theſe are prolonged to the middle, and form a riſing, which terminate by a crooked point. The inferior mandible receives the ſuperior, and, as it were, frames it, being covered with the ſkin of the neck: both mandibles are cutting at their edges, of a very hard horny ſubſtance; the bill four inches long: the bird never uſes this powerful weapon to moleſt others, but in watery ſavannas: perched on projecting branches, he waits the paſſing of fiſh, on which he darts, and inſtantly riſes: he walks in a ſtrained attitude, his neck bent, and his back humped: is wild, and keeps aloof from habitations. His eyes being near the root of his bill gives him a ſavage air. When taken, he clatters his bill, either in anger or fear, and erects the long feathers on the top of his head. Some are grey, ſome brown; both have naked necks, whoſe ſkin ſeems capable of extenſion: yellowiſh toes, thin and long; tail ſhort, and does not exceed the wings when folded.

THE AVOCETTA OR SCOOPER.

THE avocetta is chiefly found in Italy, but paſſes into the north, and moſt parts of Europe, and now and then comes over into England. It is about the ſize of a pigeon, is a pretty upright bird, and has extremely long legs for its ſize, ſeven or eight inches long, which are the more remarkable, as web-footed birds have ſhort legs. But its ſingularity of figure is the bill, which turns upward. This extraordinary

The Avocetta

bill is thin, weak, black, flat, ſharp, and flexible, tender and almoſt membranous at the end, and about three inches and a half long; incapable of defence or effort.

From its being bare a long way above the knee, it appears that it lives and wades in waters of a few inches depth, in deeper it ſwims; is very lively and alert; is very wandering, often paſſing but one day in a place: when ſtarted from its neſt, ſhams remarkably lame; is very difficult to take; is ſpread over Europe, yet is rare. It has a chirping, pert note, we are told; it is web-footed.

It is difficult to conceive how this bird lives, with ſo feeble and ſeemingly ſo ill-adapted a bill; the ſofteſt mud ſeems too troubleſome, if not too hard, for ſo weak an inſtrument to ſtir. It is ſuppoſed, therefore, to feed on worms, and on the ſpawns of fiſhes which float on the water. Its ſtomach contains only a gelatinous matter, and ſometimes parts of inſects, always mingled with ſmall cryſtalline pebbles.

Its plumage is ſnow white in front, chequered with black on the back; tail white, feet blue.

The CORRIRA or RUNNER, of ALDROVANDUS, has the longeſt legs of all web-footed fowl, except the flamingo and avocetta; the bill is ſtraight, yellow, black at the end; pupils of the eyes ſurrounded with two circles, one bay-coloured, the other white; below, near the belly, it is whitiſh; the tail, with two white feathers, black at the extremities; the upper part of the body ruſt colour; runs very faſt, whence its name; inhabits Italy. Thus we ſee the flamingo, the avocetta, and the runner, have the long legs of the crane kind, yet in their almoſt-webbed feet, approach the direct water-claſſes.

OF

SMALL BIRDS OF THE CRANE KIND.

THIS liſt compriſes the CURLEW, about the ſize of a capon, with a bill uniformly bending downwards, five or ſix inches long: the WOODCOCK, under the ſize of a pigeon; bill three inches long: the GODWIT, of the ſame ſize; bill four inches: the GREEN-SHANK, longer legged; bill two inches and an half: the RED-SHANK, differing in colour of its feet from the former: the SNIPE, leſs by half; bill three inches.

With

With ſhorter bills—The RUFF, a collar of feathers round the neck of the male; the KNOT, the SAND-PIPER, the SANDERLING, the DUNLIN, the PURRE, and the STINT.

With bills very ſhort—The LAPWING, the GREEN PLOVER, the GREY PLOVER, the DOTTREL, the TURNSTONE, and the SEA-LARK. Theſe, with their affinities, are natives or viſitants of this country, its ſhores, rivers, and marſhes. The foreign birds of this kind would extend the liſt to above an hundred.

All theſe birds are bare of feathers above the knee; and ſome half way up the thigh. This is partly natural, and partly produced by habitually wading in water. The older the bird, the barer its thighs; yet even the downy covering of the young ones does not reach ſo low as in birds of other claſſes. They run with great ſwiftneſs for their ſize, and the length of their legs aſſiſts their velocity: they are equally ſwift of wing, and traverſe immenſe tracts of country without much fatigue.

All birds of this claſs live on animals of one kind or another. The long-billed birds ſuck up worms and inſects from the bottom; thoſe furniſhed with ſhorter bills, pick up ſuch inſects as lie nearer the ſurface of the meadow, or among the ſands on the ſea-ſhore.

The CURLEW, the WOODCOCK, the SNIPE, are ever ſeen in plaſhy brakes, under covered hedges, ſeeking inſects in their worm ſtate. Their bills are long for ſearching, but are further endowed with exquiſite ſenſibility at the point, for feeling their proviſion. They are furniſhed with three pair of nerves, equal almoſt to the optic nerves in thickneſs; which paſs from the roof of the mouth, and run along the upper chap to the point.

The LAPWING, the SAND-PIPER, and the RED-SHANK, run with ſurpriſing rapidity along the ſurface of the marſh, or the ſea-ſhore, quarter their ground with great dexterity, and leave nothing of the inſect kind that happens to lie on the ſurface.

Theſe birds ſeem ever employed, ſeldom reſt by day; and, during night, every meadow and marſh reſounds with their calls to courtſhip or to food. They ſeem provided by nature with a warmth of conſtitution to fit them for the cold element. They reſide, by choice, in the coldeſt climates; and, as other birds migrate here in ſummer, their migrations hither are moſtly in winter. Thoſe that reſide among us the whole ſeaſon, retire in ſummer to the tops of our bleakeſt mountains; where they breed, and bring down their young, when the cold weather ſets in.

The

The CURLEW, the WOODCOCK, the SNIPE, the GODWIT, the GREY PLOVER, the GREEN and the LONG-LEGGED PLOVER, the KNOT, and the TURNSTONE, are rather the gueſts than the natives of this iſland. They viſit us in the beginning of winter, and forſake us in the ſpring. They then retire to the mountains of the north. Their weak and delicately pointed bills are unfit to dig into a reſiſting ſoil; and their prey is departed, were they able to reach its retreats. The coldeſt mountains of the north are then a preferable habitation; the marſhes there are never totally dried up; and the inſects are in abundance, both above ground and underneath.

The LAPWING, the RUFF, the REDSHANK, the SAND-PIPER, the SEA-PIE, the NORFOLK PLOVER, and the SEA-LARK, breed in this country: yet wander on ſome occaſions to the northern climates; eſpecially when our ſummers are peculiarly dry.

In neſtling and bringing up their young, one method takes place univerſally. As all run and feed on the ground, all neſtle there; their number of eggs is from two to four; the neſt is made without art; the eggs are laid in ſome little depreſſion of the earth, or on a few bents and long graſs that ſcarcely preſerve them from the moiſture below. Yet ſuch is the heat of the body of theſe birds, that their time of incubation is ſhorter than with any others of the ſame ſize.

Such are the general habits of this claſs of birds; as ſeveral of them have however peculiar and remarkable manners, we ſhall notice ſome more particularly.

THE WOODCOCK

IS famous as excellent game: is rather a ſtupid bird, and caught with no great difficulty: comes over in the beginning of winter; if it does not forſake a country, retires to the mountains, where it reſides and breeds during ſummer; returns to the moiſt plains in winter. The firſt ſevere froſts or ſnow oblige it to deſcend: commonly arrive in the night, or in a foggy day, few together; never in troops: alight on thick hedges, and prefer where many leaves have fallen; here they hide by day; in twilight quit their retreat, to ſeek humid ſpots. When followed by the ſportſman, flies briſkly, but not far; plunges behind buſhes, and drops as ſuddenly as lead; inſtantly runs a little way; but ſtops, holds up his

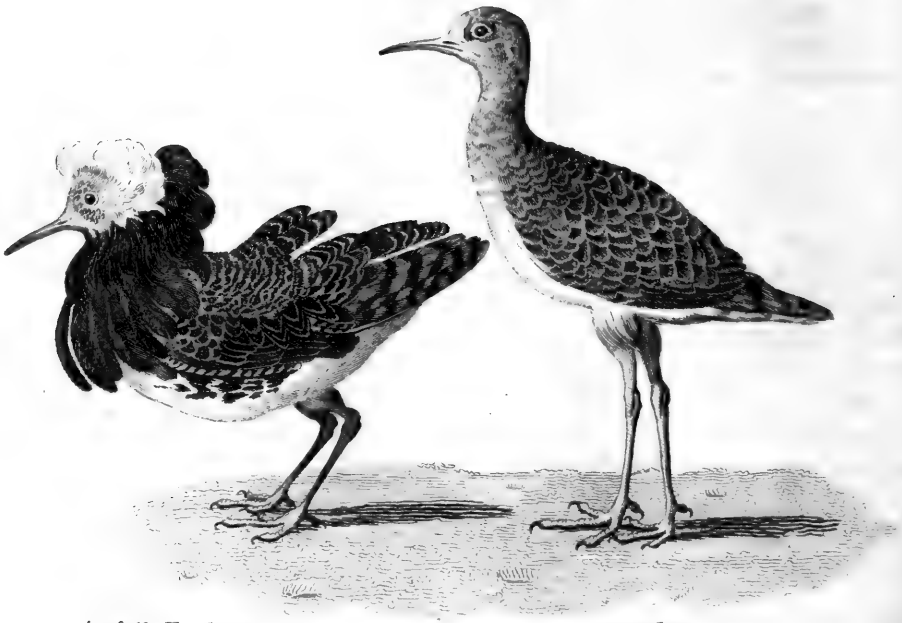
head, and looks around him, to ſee that all is ſafe, before he thruſts his bill into the earth. It is ſuſpected, that though this bird's eyes be large, he ſees beſt by twilight, his movements being by much the briſkeſt morning and evening; even thoſe kept in a room, though quiet during the day and night, yet regularly took flights morning and evening. At full moon is very vigilant; feeds on worms; does not ſcratch the earth with its feet, but turns leaves, earth, &c. with its bill, briſkly to right and left; is thought to ſeek its food by ſmelling. In ſize, equals the partridge. Dogs never eat woodcocks; probably diſliking their ſcent. The young run very ſoon: the old ones have been ſeen to carry a young one when purſued: the male never quits the female, while the young are with her; is ſilent except in breeding-time. Sits with the female, and both ſeem to enjoy laying their bills on each other's back. The ſpecies is greatly ſpread. There is a white woodcock.

THE SNIPE

GREATLY reſembles the woodcock in appearance; and indeed might almoſt, without impropriety, be called the *Little Woodcock:* but the ſnipe does not frequent woods, but is confined to marſhes, and watery plaſhes: flies ſo high as to be inviſible, yet is heard; having a little cry like a kid, *mee, mee, mee:* never reſides on mountains: is of paſſage; comes in winter, goes away in ſpring. The ſnipe is continually piercing the earth, yet nothing is found in his ſtomach but earthy *reſiduum* and liquid; probably the ſubſtance of the worms it eats is thus melted. The tip of its tongue is ſharp, to pierce ſuch prey. Hides itſelf carefully among reeds by day. The ſpecies greatly ſpread throughout the world.

The JACK-SNIPE is but half the ſize of the former: is called by ſome *deaf*; for it hides cloſely among reeds, and never ſtirs till almoſt trod upon, as if it heard nothing of its purſuer. Is leſs of paſſage than the former.

The DUNLIN differs a little in plumage, but nothing in manners.



in full Feather *moulted*

The Combattant

THE COMBATANT,

OR FIGHTER, called alſo (the male) the *Ruff*, and (the female) the *Reeve*. In the beginning of ſpring, when theſe birds arrive among our marſhes, the males engage each other with deſperate fury; not only ſingly, but alſo in troops, regulated and orderly, marching one againſt the other. The males are ſaid to be more numerous than the females: theſe ſpirit up the warriors, await at hand the iſſue of the war, and reward the victors with their company; and the conquered, if they hear the cry of freſh females, again enter the liſts, if oppoſed. They are thought to come from the north.

This bird furniſhes a remarkable inſtance of variation at different periods. Their ruff begins to ſhew itſelf ſoon in ſpring, and ſubſiſts only during the ſeaſon of courtſhip: the ſame is obſerved of the eruption of a multitude of little fleſhy pimples, full of blood, which riſe on the forepart of the head, and round the eyes; the whole together forming a total diſſimilarity in the ſame bird. This ruff moults off at the end of June, the pimples flatten and diſappear, and their places become covered with feathers; then both ſexes are alike.

In Lincolnſhire they are taken in great numbers, and are fattened for ſale with bread and milk. To keep them quiet they muſt be ſhut up in darkneſs; for if light, though but little, be admitted, they fight. Among other birds in an aviary, they challenge all round: if there be a green turf in a corner, they fight for its poſſeſſion; and, as if they were ardent for glory, they fight with eſpecial fury in the preſence of ſpectators. Their ruff ſerves for defence, they erect it when fighting; it is of various colours in various birds; rarely white, often dark coloured.

THE LAPWING

SEEMS to have taken his name from the ſound of his wings, which ſomewhat reſembles the noiſe of falling wheat, in fanning. Has a tuft, conſiſting of five or ſix thin, long, black ſhafts, falling behind on his neck. Is very lively; perpetually in motion, and friſking as well in the air, as when on the ground. Comes in the ſpring; viſits the fields of green

corn, and marſhes. Having cleared away from the hole where a worm is lodged, the little rolls of earth which the worm ejects, and thus opened the hole, he ſtrikes with feet, and ſtands ſtock ſtill, accurately watching: this ſlight commotion alarms the worm, and prompts him to quit his retreat; but the moment he appears, the Lapwing ſeizes him. When the worms come out in the evening, to enjoy the freſh dew, the Lapwing running in the graſs, feels them with his feet, and thus ſecures them.

When they firſt arrive they are in flocks; but they ſoon ſeparate, and pair, after a few battles among the males. The young females expoſe their neſts more than the older. The arts of the Lapwing to divert men or dogs from her neſt, are perfectly amuſing: if ſhe perceives the enemy approaching, ſhe boldly runs to meet them; when as near them as ſhe dare venture, ſhe riſes with a loud ſcreaming before them, ſeeming as if juſt fluſhed from hatching; while ſhe is probably a hundred yards from the neſt. Thus ſhe flies, with great clamour and anxiety, whining and ſcreaming, round the invaders, and fluttering as if wounded. To add to the deceit, ſhe appears more clamorous, as more remote from the neſt. If there be dogs, ſhe flies heavily at a little diſtance before them, as if maimed; vociferous and bold, but never offering to move toward the quarter where her treaſure is. The dog purſues, in hopes every moment of ſeizing the parent, and by this means actually loſes the young; for the cunning bird, when ſhe has thus drawn him off to a proper diſtance, then puts forth her powers, and leaves her aſtoniſhed purſuer to gaze in vain.

THE OYSTER-CATCHER

FREQUENTS the ſea-ſide, feeds on ſea-worms, oyſters, limpets, and other ſhell-fiſh, which he gathers on the ſands. He is always found on the beach, or on reefs of rocks, dry at low water; there he carefully watches the flux and reflux of the tide, never ſtraying far from the ſhore: he has alſo been called the SEA PIE, as well becauſe his plumage is black and white, as becauſe, like the Pie, he is in continual clamour, eſpecially when in a troop; but the name ſeems miſapplied: the ſpecies is greatly ſpread throughout the world; is the ſize of a crow; his bill four inches long, is narrowed, and as it were compreſſed, above the noſtrils, and flat on the ſides, having ſome reſemblance to an old-faſhioned hatchet;

hatchet; which ſtructure adapts his bill to detach from the rocks, or to raiſe from the ſands, thoſe ſhell-fiſh which compoſe the food of this bird. He has only three toes, little or no membranes; yet ſometimes ſwims, following the courſe of the water, reſting on it, or quitting it, at his pleaſure; probably eats worms, like others of this claſs; yet in his ſtomach are uſually found oyſters or their parts. She lays her eggs on the ſands, above high water mark, without any preparation; lays five or ſix eggs: quits them during the middle of the day. Of this bird the bill and feet are coral red; feet and toes ſcaly and hard; eye-lids red, iris yellow; tail ſhort.

THE TURNSTONE.

HIS manners are well expreſſed by his name; for his cuſtom is to turn all the ſtones he ſees on the water edge, in hopes to find under them worms and inſects on which he feeds; he turns them by the force of the upper part of his bill, very quickly, even though they weigh two or three pounds, which, in a bird the ſize of a thruſh, expreſſes great ſtrength, and great dexterity; his bill is of a very hard ſubſtance, is very thick at the baſe, though ſharp at the point; its upper part is a little compreſſed, and ſlightly turned upwards; is black; about an inch long; feet orange-coloured; plumage black and white. The ſpecies is pretty much ſpread.

THE WATER-OUZEL

SHOULD with juſtice be detached from among the Ouzels; for though his ſize be nearly like theirs, his plumage dark, and his breaſt white (as are ſome ouzels), yet he is ſilent, ſlow in his movements, neither bounding nor hopping; he frequents the clear ſtreams of high mountains, preferring thoſe whoſe deſcent is rapid, and whoſe beds are rocky and ſtony; he is found near torrents, caſcades, and limpid ſtreams, which run over gravelly ſtrata; he enters the water wholly, gradually, without plunging, walking in it at the bottom, and following the inclinations of its bed; ſtrolling at his eaſe, as if on land; letting his wings drop, and ſhaking them; here he feeds on little fiſh and water inſects. His

feet reſemble thoſe of the ouzel kind; his nails are ſhort and hooked; bill ſhort and thin; his plumage is thick, oily, downy, and impenetrable by the water; tail ſhort: neſtles by the ſide of a ſtream; makes his neſt of moſs, covered at top like an oven.

THE RAILS

ARE a numerous family, inhabiting the marſhy ſides of lakes and rivers, eſpecially if covered with water-weeds. This is the conſtant diſpoſition of Water Rails; the Land Rail inhabits meadows: all have the body thin, compreſſed on the ſides, little or no tail; ſmall head; bill almoſt like a cock, but longer.

The WATER RAIL runs along the ſides of ſtanding waters as quick as the Land Rail does among graſs; he is always hid among ruſhes, and only quits his retreat to croſs the lake, ſwimming or running, for often he runs lightly over the large leaves of the water-plants; he makes paths among ſuch herbage, and by theſe goes and returns; he keeps very cloſely in his hidings, and is not without great difficulty made to quit his ruſhes; and flies, as the laſt reſource: about the ſize of the Land Rail; bill longer; reddiſh near the head; feet obſcure red, ſometimes yellow; belly and ſides ſtriped tranſverſely white upon black; under parts grey ſlate colour; upper parts browniſh red, approaching to olive.

The PEARLED RAIL is but the ſize of a lark; his plumage brown olive, ſpotted and clouded with white; hides and neſtles in the ruſhes: its neſt in form reſembles a *gondola*; is compoſed of reeds interwoven, and firmly attached to ſome tuft of ruſhes, ſo as to riſe and fall with the ſtream; the young, the moment they are diſcloſed, run, ſwim, and dive; and ſoon ſeparate, for this bird is ſolitary at all times; is, like all Rails, ſo hard to ſtart, that the ſportſman may ſometimes take it with his hand, or ſtrike it with a ſtick. The kind is ſpread generally, and in the marſhes of America exceeds the European.

THE

The Jacana

THE JACANA

HAS been by ſome referred to the kind of Water-hens, but though reſembling in manners, yet in figure, and other particulars, is very diſtinct, having ſpurs to each wing, and a membranous kind of *comb* on his head. The toes and nails exceſſively long; that behind as long as the middle one before; all the nails round, ſharp, and piercing; whence ſome have called him *Surgeon*. Inhabits the marſhes of Brazil and Guyana, feeding on water-inſects, &c. There are three or four ſpecies of this bird, which differ in colours, not in ſize.

In one ſpecies, the head, neck, and front are black, with a tint of violet; the great wing-feathers green; the reſt of his upper part cheſtnut, verging on purple; each wing is armed with a ſharp ſpur iſſuing from the ſhoulder: from the baſe of the bill riſes a membrane, which falls over the forehead, divides into three parts, and falls on each ſide of the bill; the bill is ſtrait, a little ſwelled at the end, of a bright yellow, as are his ſpurs; the tail ſhort; his legs half way bare of feathers. In ſize leſs than a pigeon; but his long legs and neck make him ſeem larger. Go ordinarily in pairs, and, when accidentally ſeparated, clamour after each other; are very wild, and only to be approached by art. Viſit St. Domingo, not only after the great rains in May and November, but ſome are ſeen after any heavy rain, whence it is concluded, that their reſidence is not diſtant. Their flight is low, but rapid; their cry is audible from afar, and has ſome affinity to an owl's; ſo that poultry in the yards are frightened by it: yet is not known to be of prey. Some are greeniſh black; ſome have the green reflections of the Pigeon.

THE PORPHYRION, OR SULTANA HEN,

WAS well known to the antients, but, till lately, loſt to the m[illegible]. The firſt of the kind ſubmitted to examination came from Ma[illegible]gaſcar, but it has ſince been found to breed in Sicily, in the lake L[illegible]. This bird is gentle, innocent, timid, fond, ſeeking ſolitude a[illegible] places, hiding itſelf when eating, when approached has a ſhar[illegible] ending internally. Prefers fiſh, but eats fruits and roots; can l[illegible] grain; often ſoaks his food, repeatedly; if the piece be ſomewha[illegible] he graſps it in one foot, and, holding it half way to his mouth, ea[illegible]

morſels; for his legs are longer in proportion than his neck is, according to the general make of birds. His plumage is blue, ſoft, and ſhining, with ſplendid reflections; his feet long, and a kind of flat piece on his head, bare of feathers, as it were a large ſcale; the baſe of his bill is of a beautiful red; a tuft of white feathers at the tail ſets off his blue plumage. The female reſembles the male, but is rather leſs; not quite equal to a Hen in ſize. This beautiful bird has all the qualities requiſite to domeſtication, and was domeſticated among the Romans, but for ſhew only. Lays ſix white eggs, round; duſts itſelf like the Cock; its toes are very long; no membranes. Male and female aſſiſt in making the neſt.

THE KING-FISHER

EXHIBITS the beautiful plumage of the peacock, the ſhadings of the humming bird, the bill of the crane, and the ſhort legs of the ſwallow.

Not much larger than a ſwallow; ſhape clumſy; legs diſproportionably ſmall; bill diſproportionably long; two inches from the baſe to the tip; the upper chap black, and the lower yellow; the crown of the head and the coverts of the wings are of a deep blackiſh green, ſpotted with bright azure; the back and tail are of the moſt reſplendent azure; the whole under-ſide of the body is orange-coloured; a broad mark of the ſame paſſes from the bill beyond the eyes; beyond that a large white ſpot; the tail is ſhort, and conſiſts of twelve feathers of a rich deep blue; the feet are of a reddiſh yellow, and the three joints of the outmoſt toe adhere to the middle toe, while the inner toe adheres only by one; which is a ſingular conformation.

Is for ever on the wing, and feeds on fiſh; frequents the banks of rivers; and takes its prey, in winter eſpecially, by balancing at a certain diſtance above the water for a conſiderable time, then falling like lead into the water, and ſeizing the fiſh with inevitable certainty. While ſuſpended in the air, in a bright day, the plumage exhibits a beautiful variety of the moſt dazzling and brilliant colours; but he often ſits on a projecting branch or ſtone, watching the water.

The King-fiſher with which we are acquainted at preſent, though moſt likely the ancient Alcyone, has none of thoſe powers of allaying the ſtorm, or building upon the waves, with which fable furniſhed it anciently; but

but is contented to make its neſt on the banks of rivers, in ſuch ſituations as not to be affected by the riſing of the ſtream. When it has found a place for its purpoſe, it hollows out with its bill a hole about a yard deep; or if it finds the deſerted hole of a rat, or one cauſed by the root of a tree decaying, it takes quiet poſſeſſion. This hole it enlarges at the bottom to a good ſize, lining it with the down of the willow, and partly cloſing the opening. Here are found great quantities of bones and ſcales of fiſhes, the remains of the bird's food. The king-fiſher, as Belon ſays, feeds upon fiſh, but is incapable of digeſting the bones and ſcales, which he throws up again, as eagles and owls are ſeen to do a part of their prey; but this is not confirmed by ſome late obſervers, though its ſeems probable. In theſe holes, which from ſuch remains are very fœtid, the king-fiſher is often found with five eggs to nine. There the female continues to hatch, even though diſturbed; and though the neſt be robbed, ſhe will again return and lay there. She begins to lay early in the ſeaſon, and excludes her firſt brood about the beginning of April. The male brings her large proviſions of fiſh while thus employed; and, contrary to moſt other birds, ſhe is found plump and fat at that ſeaſon. The male, that uſed to twitter before this, now enters the neſt as quietly and as privately as poſſible. The young ones are hatched at the expiration of twenty days; but are ſeen to differ as well in their ſize as beauty. Theſe birds are not numerous; there are twenty ſpecies in the tropical climates of the old world, and ſeven or eight in the new.

THE WATER-HEN.

THE Water-hen is rather compreſſed on the ſides of her body; the bill ſomewhat approaches the cock kind, but ſhorter; the forehead bare of feathers, and covered with a thick brick-coloured membrane, (as are ſome ſpecies of rails): flies with her feet hanging; has long toes, with a membranous border round them; legs long; thighs partly bare; wings ſhort.

Reſides entirely where her food lies; and never leaves the pond or river in which ſhe feeds, along the graſſy banks, and often along the ſurface of the water; does not ſwim far or much; but hides among the water weeds, and roots of aquatic trees, and only quits them in the evening, firſt covering her eggs, when hatching, with ruſhes and graſs; ſhe hides her neſt very ſucceſsfully, as alſo her young, which are rarely taken. She builds her neſt on low trees and ſhrubs, of ſticks and fibres, by the

water edge. Her eggs are ſharp at one end, white, with a tincture of green, ſpotted with red. She lays twice or thrice in a ſummer; her young ſwim the moment they leave the egg, purſue their parent, and imitate all her manners. She rears, frequently, two or three broods in a ſeaſon; and when the young are grown up, ſhe drives them off to ſhift for themſelves.

According to the ſeaſon, forſakes or return to neighbouring mountains, deſcending in hard weather; the ſpecies is greatly ſpread. There are three races, diſtinguiſhable by their difference in ſize. Plumage iron-grey and white.

THE COOT,

THOUGH not entirely web-footed, is as good a ſwimmer as any bird whatever; and perhaps paſſes as much of its time on the water as any, except the Divers: is rarely ſeen on the land, or, if ſeen there, is ſo out of its element that it may be taken with the hand; flies and ſeeks its food at night; and, like many water birds, ſees diſtinctly in obſcurity; keeps in rivers, and among ruſhy margined lakes. It there makes a neſt of ſuch weeds as the ſtream ſupplies, and lays them one on another, without order, among the reeds, floating on the ſurface, and riſing and falling with the water. The reeds keep it faſt; ſo that it is ſeldom waſhed into the ſtream; but if this happens, the bird ſits in her neſt, like a mariner in his boat, and with her legs ſteers her cargo into the neareſt harbour: there ſhe continues to ſit in great tranquillity, regardleſs of the impetuoſity of the current; and though the water penetrates her neſt, ſhe hatches her eggs in that wet condition.

When diſturbed in her retreat, hides among the ruſhes, and even in the mud, rather than take to flight; the young are playful, and not ſo circumſpect, which expoſes them to the deſtructive pounces of the buzzard; they often dive ſo inſtantly as to eſcape the ſhot fired at them. In early winter they aſſemble in lakes, and, though chaſed by boats, only fly from ſide to ſide of the lake, by which obſtinacy many hundreds are killed: lays eighteen or nineteen eggs, hatches in twenty-two or twenty-three days; the young directly leap into the water, and never re-enter the neſt; are then black and downy; the white creſt-like ſurface on the head ſcarcely diſcernible. This ſubſtance is a prolongation of the upper layer, which compoſes the upper mandible; this is ſoft and almoſt fleſhy at the baſe. Plumage black, in ſize equals a hen; its feet have a large membranous border, ſcolloped; lives on water-inſects, ſmall fiſh, &c. ſometimes eats grain: their fleſh is black.

THE GREBE

IS diſtinguiſhed by a tippet, and a plumage which unites to the ſoftneſs, cloſeneſs, and thickneſs of down, the ſpringineſs of feathers, and the luſtre of ſilk; eſpecially the plumage of the breaſt is a compact, ſmooth, regular layer, forming one uniform ſurface, impenetrable both to cold and wet; by this ſubſtantial clothing, the bird is enabled to ſuſtain the moſt rigorous winters, though conſtantly on the waters. The feet of this bird have a membrane, which is divided, and cut into ſcollops round each toe; his legs are placed very much backward, and he takes his flight with very great labour, to which he is with difficulty excited; and endeavours to avoid it, ſwimming always againſt the wind. On land is eaſily caught, yet defends himſelf well with his bill; in the water is as active and alert, as heavy on land; ſwims, dives, and floats admirably; purſues fiſh to great depths; and is often taken in nets; frequents equally ſalt water, and freſh rivers, and lakes. The ſize of a Coot; about one foot ſix inches from bill to tail: nearly two feet from bill to toes; plumage deep ſhining brown on the back; the front of moſt ſilvery white; head ſmall; bill ſtrait, ſharp; a little red ſkin round the eye, wings ſhort, voice ſtrong; foot ſpread, and flatted, covered with ſcales; nails large and flat; no tail but a rump; is generally very fat; eats weeds as well as fiſh; neſtles on rocks, near the ſea; but around lakes makes a neſt of ruſhes and reeds, floating on the water, and faſtened to ſome ſecure ſtation.

The *tufted* Grebe is ornamented by a plume from the back of his head, falling behind, capable of elevation and depreſſion; is larger than the common Grebe. The *little* tufted Grebe differs, in that his tuft *divides*, as does that of the *horned* Grebe; he has alſo a kind of mane, or ſtaring hair, red at the root, black at the point, ſurrounding his neck, which gives him a ſtrange wildneſs of air: he is larger than the common. There is a leſs of this kind.

The *cheſnut-coloured* Grebe, is not only diſtinguiſhed by his colour, but by being among the ſmalleſt birds that navigate the ocean; he frequents alſo rivers, eſpecially in winter, when he is very fat; eats ſmall fiſh, and ſmall ſhell-fiſh.

The name of this family, in many parts of England, is DOB-CHICK: the ſpecies inhabits moſt parts of the world.

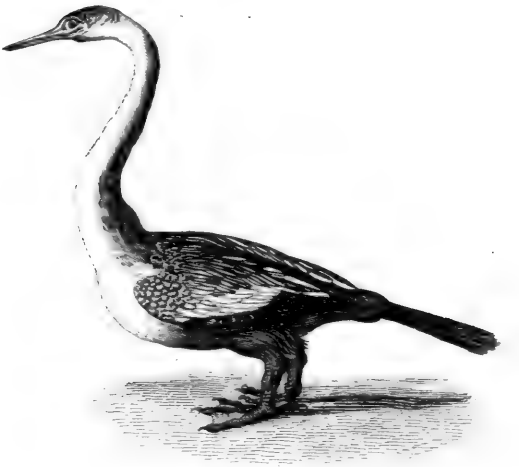
THE

THE ANHINGA

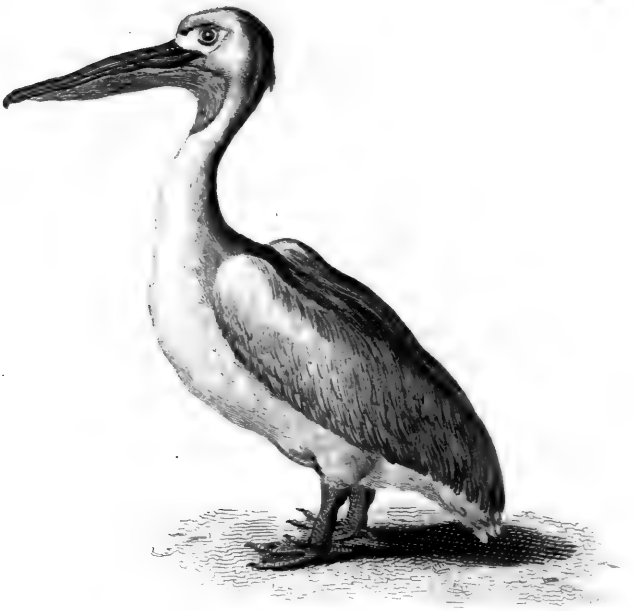
IS among the moſt remarkable of birds by its form, which ſuggeſts the idea of a reptile mounted on the body of a bird: its neck exceſſively long and thin; its ſmall cylindric head, ſharpened into a long pointed bill, reſembles the figure and alſo the motions of a ſerpent, as well in the manner of the bird's ſuddenly thruſting forward his neck when quitting a tree, as in his manner of ſtriking at fiſh, when in the water; the head and neck are covered with down, cloſe ſet, and ſoft as velvet; the eyes are brilliant black, the iris golden, a naked ſkin ſurrounds them; the point of the bill is furniſhed with ſmall jagged points turning backward; the body is about ſeven inches long; the neck alone is double that length; the tail is large, formed of twelve ſpreading feathers, unlike moſt water-birds; yet the anhinga ſwims and dives, holding its head above water; but this it withdraws on the leaſt appearance of danger; is very wild; never taken on the ſhore; is always on the water, or perched on the tops of the higheſt trees along the ſides of rivers, or drowned ſavannas, where he neſtles; is among the number of birds perfect palmipeds, or having toes completely united by a membrane; the nail of the middle toe dentelated internally like a ſaw. Its ſkin is very thick; its fleſh not eatable, but very at; its plumage mingled with grey; its wings are long, the colours of ſome reddiſh. Found principally in America, but ſome in Africa.

THE PELICAN.

THE Pelican is among the largeſt of water-birds; much larger in the body than a ſwan, and ſomewhat of the ſame ſhape. Its four toes are all completely webbed together, are red or yellow; and its neck in ſome meaſure reſembles that of a ſwan: its ſingularity is its bill, and the great pouch underneath. This enormous bill is fifteen inches from the point to the opening, which is behind the eyes; at the baſe is ſomewhat greeniſh, but varies towards the middle and end, being reddiſh. It is flat at top, very thick in the beginning, but tapers off to the end, where it hooks downwards. The under-chap is ſtill more extraordinary; it conſiſts of two flexible branches, which divide to accommodate the ſize of the pouch which hangs to it, reaching the whole length of the bill to the neck, and ſaid to be capable of containing fifteen or twenty quarts of water;



The Anhinga.



The Pelican.

ter; is large enough to contain a man's arm or head. This bag the bird has a power of wrinkling up into the hollow of the under chap; but by opening the bill, and putting one's hand down into the bag, it may be diſtended at pleaſure. The ſkin of which it is formed is a blueiſh aſh-colour, with many fibres and veins running over its ſurface. Is not covered with feathers, but with a ſhort downy ſubſtance, as ſmooth and as ſoft as ſattin. When this bag is empty it is not ſeen; but when the bird has fiſhed with ſucceſs, it is often incredibly dilated. The firſt thing the pelican does in fiſhing is to fill up this bag; and then it returns to digeſt its burthen at leiſure. It is compoſed of two ſkins, one the outſide ſkin of the neck, the internal that of the gullet. When the bird ſwallows his prey, this bag is cloſed by two muſcles, to prevent the water paſſing into the gullet; alſo, to prevent ſuffocation, the wind-pipe quits its uſual place, and is projected. The noſtrils are very ſmall, placed at the root of the bill.

Its legs are ſhort, but its wings extend eleven or twelve feet, and are capable of raiſing it great heights; at theſe elevations he balances nicely, and falls plump on his prey, ſtriking the water with his whole extent of wing, making it foam, and daſhing ſo as to confound the fiſh: thus one proceeds when ſingle; when in troops they range in a line, or ſwim in a circle, *cloſing* on the fiſh. They fiſh morning and evening. It is pleaſant to ſee them riſe ſeveral feet above the water, their pouches half full, then dart again for more. To digeſt their food they fly to ſome rock, where they ſit with their heads laid on their ſhoulders: at night perch upon trees. Are very unclean and filthy; their fleſh ſmells inſufferably. Preys in freſh water as well as at ſea; yet avoids marſhes, but frequents dry countries, as Arabia and Perſia, where it is called *water-carrier*, for ſhe carries to her neſt her pouch full of water. The Egyptians call it *River-camel*, from the ſame circumſtance.

The bird preys upon fiſh of ſeven or eight pounds weight, and hides them by dozens in its pouch. Du Tertre affirms, that it will hide as many fiſh as will ſerve ſixty hungry men for a meal. It is ſaid it will eat rats, &c.

This bird weighs twenty-four or twenty-five pounds, yet its ſkeleton not one pound and a half; his bones are ſo thin they are tranſparent: the air which enters this bird, is conveyed manifeſtly and evidently even into the quills of his feathers, filling a cellular membrane, which ſurrounds the whole body under the membrane whence the feathers grow, inſomuch that, by preſſure of the parts, the eſcape of the air is remark-

able. Probably other birds have the ſame powers in various degrees, but not ſo traceable.

Its amazing pouch may be conſidered as analogous to the crop in other birds, with this difference, that as theirs lies at the bottom and within the gullet, ſo this is placed on the outſide, and under the bill; it has no digeſtive heat. She brings the fiſh *freſh* to her young; to diſcharge its contents, preſſes the pouch on her breaſt. At the bottom of its bag is a tongue, but ſo ſmall that many have ſaid it had none. When tame is very thieviſh in fiſh-markets. Eats ſideways, and catches what is thrown to it.

The pelican, ſays Labat, has ſtrong wings, furniſhed with thick plumage of an aſh-colour, as are the reſt of the feathers over the whole body; on the neck a ſhort down; on the nape of the neck longer, forming a ſmall tuft. Its eyes are very ſmall, when compared to the ſize of its head, which is flattiſh on the ſides; its cheeks naked; its countenance and its air melancholy. Torpid, inactive and gluttonous.

The female drops her eggs on the bare ground to the number of five or ſix, and there continues to hatch them. She feeds her young with fiſh from her bag; and, when they cry, flies off for a new ſupply.

The Americans kill vaſt numbers, to convert their large bags into purſes and tobacco-pouches, dreſſing the ſkin with ſalt and aſhes, rubbing it well with oil. It thus becomes ſo ſoft and pliant, that the Spaniſh women ſometimes adorn it with gold and embroidery to make work-bags of.

Father Raymond aſſures us, he has ſeen one that would go off in the morning at the word of command, and return before night to its maſter, with its great paunch diſtended with plunder; part of which it was made diſgorge, and part it reſerved.

"The pelican," as Faber relates, "is not deſtitute of other qualifications. One of thoſe which was brought alive to the Duke of Bavaria's court, where it lived forty years, ſeemed to be poſſeſſed of very uncommon ſenſations. It was much delighted in the company and converſation of men, and in muſic, both vocal and inſtrumental; for it would willingly ſtand," ſays he, "by thoſe that ſung or ſounded the trumpet; and ſtretching out its head, and turning his ear to the muſic, liſten very attentively to its harmony, though its own voice was little pleaſanter than the braying of an aſs," whence the Greeks named it *onocrotalos*. Geſner tells us, that the emperor Maximilian had a tame pelican which lived for above eighty years, and that it always attended his army on their

march. It was one of the largeſt of the kind, and had a daily allowance by the emperor's orders.

THE CORMORANT.

THE Cormorant in ſize nearly equals a gooſe, but is rather ſlender; its four toes are completely united by membranes together; the middle toe being toothed or notched like a ſaw, to aſſiſt it in holding its fiſhy prey. The bill is ſtraight, till near the end, where the upper chap bends into a hook; plumage black, or variegated with deep brown; two white ſpots outſide of the legs; front of the neck white; tufts of long feathers on the head and the upper part of the neck; front and ſides of the head bald; a naked ſkin accompanies the bill beneath.

This unclean bird combines, with the groſſeſt appetites, the moſt rank and diſagreeable ſmell. More fœtid than carrion; its form diſagreeable; its voice hoarſe and croaking; all its qualities obſcene:—No wonder Milton ſhould make Satan perſonate this bird, when ſurveying the beauties of paradiſe, on the baſeſt of purpoſes.

It is ſeen as well by land as by ſea; fiſhes in freſh-water lakes, as in the ocean; builds in the cliffs of the rocks, as well as on trees; and preys not only in the day-time, but by night.

The cormorant is trained up in China for the purpoſe of fiſhing, as it was formerly in England. The fiſher carries them out into the lake, perched on the gunnel of his boat; at the firſt ſignal given, each flies a different way, to fulfil the taſk aſſigned. It is very pleaſant, on this occaſion, to behold with what ſagacity they portion out the lake or the canal. They hunt about, they plunge, they riſe an hundred times to the ſurface, until they have at laſt found their prey. They then ſeize it with their beak by the middle, and carry it without fail to their maſter. When the fiſh is too large, they give each other mutual aſſiſtance: one ſeizes it by the head, the other by the tail, and in this manner carry it to the boat together. There the boatman ſtretches out one of his long oars, on which they perch, and being delivered of their burthen, they fly off to purſue their ſport. When they are wearied, he lets them reſt for a while; but they are never fed till their work is over. They have always, while they fiſh, a ſtring faſtened round their throats, to prevent them from

devouring their prey, as otherwiſe they would at once ſatiate themſelves, and diſcontinue their purſuit the moment they had filled their bellies."

The cormorant is the beſt fiſher of all birds; and though fat and heavy, is generally on the wing. The great activity with which it purſues, and from a vaſt height drops down to dive after its prey, offers one of the moſt amuſing ſpectacles; it is often ſeen riſing heavily, with a fiſh larger than it can readily devour. It ſometimes alſo happens, that the cormorant has caught the fiſh by the tail; and conſequently the fins prevent its being eaſily ſwallowed in that poſition. In this caſe, the bird is ſeen to toſs its prey above its head, and very dexterouſly to catch it, when deſcending, by the proper end, and ſo ſwallow it with eaſe.

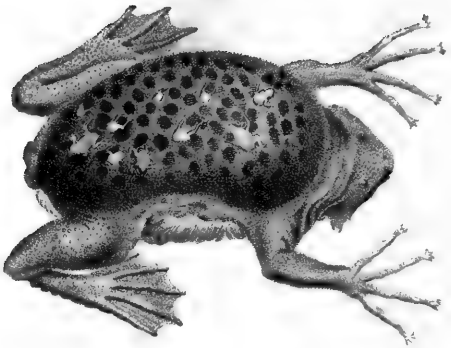
THE ALBATROSS.

THIS bird is thus deſcribed by Edwards: "The body rather larger than that of a pelican, and its wings ten feet from tip to tip; bill ſix inches long, yellowiſh, terminates in a crooked point. Top of the head bright brown; back dirty deep ſpotted brown; the belly, and under the wings white; the toes, which are webbed, fleſh colour.

Inhabits the tropical climates, and the Streights of Magellan in the South Seas. Is one of the moſt fierce and formidable of the aquatic tribes, not only living upon fiſh, but alſo ſuch ſmall water-fowl as it can take by ſurprize. It preys, as all the gull kind do, on the wing; and chiefly purſues the flying-fiſh, that are forced from the ſea by the dolphins; purſues the gulls, and obliges them to relinquiſh their prey.

Few birds float upon the air with more eaſe than the albatroſs, or ſupport themſelves longer in that element. They, night and day on the wing, are always prowling, yet always emaciated and hungry. Seem to have a peculiar affection for the penguin, and a pleaſure in its ſociety. Chooſe the ſame places of breeding; ſome diſtant uninhabited iſland, where the ground ſlants to the ſea, as the penguin is not formed either for flying or climbing. At Falkland Iſlands they build with amazing uniformity; their neſts covering fields by thouſands, and reſembling a regular plantation. In the middle, on high, the albatroſs raiſes its neſt on heath ſticks and long graſs, about two feet above the ſurface: round this the penguins make their lower ſettlements, rather in holes in the ground; and moſt uſually eight penguins to one albatroſs.

SMALLER



The Pipal.

SMALLER GULLS AND PETRELS.

OF the Gull, properly ſo called, there are above twenty kinds; of the Petrel three; and of the Sea-ſwallow ſeveral. The gulls may be diſtinguiſhed by an angular knob on the lower chap; the petrels by their wanting this knob; and the ſea-ſwallow by their bills, which are ſtraight, ſlender, and ſharp-pointed. They all, however, agree in their appetites and their places of abode.

The gull is well known in this kingdom. Is ſometimes ſeen ſlow-ſailing, hovering over rivers to prey on fiſh; ſometimes following the plowman in fallow fields to pick up inſects; and, when living animal food was abſent, has been known to eat carrion, and whatever elſe offered, as if it were the vulture of the aquatic tribes. Round our boldeſt rockieſt ſhores they appear in the greateſt abundance; there the gull breeds and brings up its young; and there millions are heard ſcreaming with diſcordant notes for months together. The rocks offer them a retreat for their young, the ſea a ſupply of food, and renders the place inacceſſible from below. Theſe are the ſituations to which ſea-fowl chiefly reſort, and bring up their young. Theſe birds, like all of the rapacious kind, lay but few eggs; and hence, in many places, their number is daily ſeen to diminiſh: lay from one egg to three, in a neſt formed of long graſs and ſea-weed. Moſt are fiſhy-taſted, with black ſtringy fleſh; yet the young ones are better food: and theſe, with ſeveral other birds of the penguin kind, the poor inhabitants of our northern iſlands make their food.

THE FRIGATE-BIRD

RECEIVES his name from the ſwiftneſs and manner of his flight. In fact, of all ſea-birds, he has the moſt powerful and durable flight, and extends his courſe to greater diſtances than any other bird. His wings are prodigiouſly long, and his motion ſmooth; he ſeems to ſwim in the air, till the inſtant his prey appears, then he darts like lightning upon it. When the ſky is tempeſtuous, he riſes above the clouds,

clouds, and ſeeks ſerener ſkies, at elevations where he is beyond our ſight. Ever on the wing, he flies night and day. Thoſe fiſh that go in ſhoals (as the flying-fiſh, &c.) are purſued by dolphins, bonitos, &c. theſe he diſcerns from amazing heights, and notices the track of a column with the greateſt accuracy: often the ſhoal is ſo large as to agitate the water, and ſo cloſed together as to whiten it; then the frigate-bird, ſkimming along the ſurface, ſeizes with his bill, or his claws, or both, thoſe fiſh which offer. Is principally found between the tropics in both hemiſpheres: tyrannizes over the Boobies, and makes them yield their prey; is a very bold bird; has ſharp claws; long hooked ſharp bill; ſhort, ſtrong feet, covered with feathers, like a bird of prey; rarely is ſeen to ſwim, yet his feet are membraned; like the boobies has no apparent noſtrils, but has ſutures on his bill. About the ſize of a hen in body; but his wings eight, ten or fourteen feet, from tip to tip. This exceſſive length of wing embarraſſes the bird when about to riſe from the ground, and obliges him to ſeek ſome ſmall elevation, for on level ground he may be killed ere he can fly. Neſtle on rocks, numbers together; ſometimes on trees; lay one or two eggs, white ſtained with fleſh colour, with dots of crimſon. The young have a grey white down; their feet and bills white, but, when adult, their colours change, becoming reddiſh or black, and blueiſh in the middle. The head is ſmall, and flat at top, the male has under his throat a membrane of a lively red, of the nature of wattles. Tail extremely forked. This, and their long wings, diſtinguiſh them. Plumage ordinarily black, with blueiſh reflections; belly white, eſpecially the females. Reſembles the boobies in the naked ſkin around the eyes, and the dentated nail of the middle toe.

THE BOOBIES.

THESE birds ſeem to have received from nature but a partial ſhare of that inſtinct, by which creatures in general are prompted to ſelf-preſervation: large and ſtrong, armed with a bill ſufficiently powerful, with long wings, and well-membraned feet; they have all the neceſſary abilities to exerciſe their faculties, as well in air, as in water, yet they ſeem ignorant of what ſhould be done, or ſhould not be done, for ſelf-defence. Spread generally in moſt climates; yet in none have they learned

The Booby

learned to know their chief enemy; but ſuffer themſelves to be taken, not only when at ſea, reſting on parts of ſhips, but on land, where they are killed in great numbers by blows with a ſtick; no one taking warning by obſervation of what happens to others, nor turning away from thoſe who thus ſlaughter their companions. To what cauſe this muſt be attributed is unknown: the difficulty of putting in motion their wings, in order to riſe, which ſome ſuggeſt, ſeems inadequate to this purpoſe. Not only man is their enemy; they are ſcarcely leſs perſecuted by the frigate bird, who, darting upon them when flying, purſuing them without remiſſion, and beating them with bill and wings, forces them to yield their prey, which is ſwallowed by their conqueror; for whom, perhaps, they labour a ſecond time for other prey, in like manner taken from them.

The booby fiſhes by flying ſteadily over the water, and falling on the fiſh the moment he perceives it near the ſurface. They inhabit iſlands even the moſt diſtant from other land. In form they pretty much reſemble the cormorant; their bill is remarkable, in that the ſuperior mandible is, as it were, articulated, and compoſed of three pieces, joined by two ſutures; that next the point giving ſomewhat the appearance of a nail to the tip of the bill; that next the head is ſo looſe as to permit the former part of the bill to open two inches, without any motion in the under chap. Their cry is ſtrong, between the crow and the gooſe; it is generally excited by fear. When flying, they ſtretch out the neck, and ſpread the tail: muſt have ſome little riſing, from whence to take flight: they perch on trees. Dampier even ſays, they neſtle on trees in the iſle of *Aves*; elſewhere they neſtle on the ground, multitudes together; lay one or two eggs; the young are long covered with a very ſoft white down.

The booby of the Antilles is leſs than a gooſe; about two feet five inches long, bill four inches and a half, the naked ſkin round the eye yellow; as alſo the baſe of the bill, its point brown; the feet pale yellow; the belly white; the reſt of the plumage aſh-coloured brown. One kind is white. The greater booby in ſize equals a gooſe; is ſix feet from tip to tip of its wings; plumage deep brown, ſprinkled with white ſpots on the head; larger ſpots on the breaſt and back. Inhabits the coaſt of Florida. Dives deeply, and is thought to be often attacked and devoured by ſharks and other voracious fiſhes.

THE GANNET, OR SOLAN GOOSE,

IS reckoned among the boobies; and is the ſize of a gooſe, but its wings ſix feet over; bill ſix inches long, ſtraight almoſt to the point; the ſides irregularly jagged, the better to hold its prey. Its colour is chiefly white; inſtead of noſtrils it has a long furrow, reaching almoſt to the end of the bill. From the corner of the mouth a narrow ſlip of black bare ſkin extends to the hind part of the head; beneath is another that is dilatable, and of ſize ſufficient to contain five or ſix entire herrings, which, in the breeding ſeaſon, it carries at once to its mates or its young; is ſometimes choaked in ſwallowing too large a fiſh.

The ſkin of theſe birds is not cloſely adhering to the fleſh, but is connected to it by little bunches of fibres, placed at unequal diſtances, as from one to two inches, and capable of extenſion, ſo that by blowing air into the ſkin it ſwells like a bladder; no communication between this interval and the thorax is diſcoverable; yet, doubtleſs, the air has paſſage, probably through the cellulary membrane.

The iſlands to the north of Scotland, the Skelig iſlands off the coaſts of Kerry, in Ireland, and thoſe in the north ſea off Norway, abound with them. But on the Baſs iſland, in the Frith of Edinburgh, they are ſeen in the greateſt abundance. In St. Kilda, Martin aſſures us, the inhabitants conſume annually twenty three thouſand young birds, beſides amazing quantities of their eggs. On theſe they principally ſubſiſt.

The gannet is a bird of paſſage. In winter it ſeeks the more ſouthern coaſts of Cornwall, hovering over the ſhoals of herrings and pilchards that then come down from the northern ſeas: its firſt appearance in the northern iſlands is in the beginning of ſpring; and it continues to breed till the end of ſummer. But, in general, its motions are determined by the migrations of the ſhoals of herrings, which it aſſiduouſly attends in their paſſage, and keeps with them their whole circuit round our iſland.

Is poſſeſſed of a tranſparent membrane under the eye-lid, with which it covers the whole eye at pleaſure, without obſcuring the ſight in the ſmalleſt degree. This ſeems neceſſary to ſecure the eyes of ſo weighty a creature, whoſe method of prey is by darting headlong from an height of an hundred feet into the water. Breed yearly, and lay but one egg, which

which being taken away, they lay another; if that is alſo taken, then a third; but never more for that ſeaſon. The young birds, during the firſt year, are of a duſky hue, ſpeckled with numerous triangular white ſpots.

THE NODDY

IS in manners cloſely related to the boobies; but in ſize reſembles the greater ſea-ſwallow, to which claſs his bill is conformable; but he has the feet of the ſea-mew. All his plumage is deep brown, except a kind of white cap on his head; like the boobies he alights on veſſels, and even on the fiſt, if held out to him. Is found near the tropics, and between them. Are very numerous; during hatching time they prey together in great flocks; when that is paſt, each becomes ſolitary, and wanders at large over the vaſt ocean. Their eggs are good food; but muſt be ſought in rocks at no little riſk.

THE SEA-SWALLOWS, OR TERNS,

COMPOSE a ſmall family of birds, which, in many reſpects, reſemble the land birds of the ſame name. Their plumage is black and white; their wings very long and thin; their tails forked; their flight alſo is ſimilar; agile, ſwift, and, as it were, wanton. They ſkim the ſurface of the water for their prey, and ſeize flying ſuch little fiſh as they there catch. In other reſpects they differ; their feet have ſmall membranes attached to the toes, and their bills are very diſtinct. Though ſeemingly capable of ſwimming, they are not fond of it, but dart down on the water, and inſtantly dart up from it. They live ordinarily on the banks of the ſea, or rivers, or lakes. They are always chattering or ſcreaming, and are extremely noiſy in neſting-time. They frequent our coaſts in ſpring, return in autumn. Some of them partly feed on inſects: are bold birds; not frightened at fire-arms. Their legs are ſhort, little adapted for walking, bare of feathers partly up the thigh; bill ſtraight, narrow, pointed, ſmooth, and flatted on the ſides. The kind is very greatly ſpread.

The great ſea-ſwallow is thirteen inches from the bill to the toes; ſixteen to the end of the tail, wings extended two feet, his ſhape elegant; his head black; his upper parts grey; his front white. They digeſt their food almoſt as ſoon as taken, for it melts in their gullet; the lower part next the ſtomach firſt, even while perhaps the tail ſticks out of the mouth. The female lays two or three eggs on the bare ſands; and it is remarked, that when the weather is warm, the egg firſt laid comes to maturity one day ſooner than that laid ſecond, as the ſecond does one day ſooner than the third: ſuch effect has the warmth of the ſand on thoſe firſt laid: but if the weather be gloomy and chilly, no ſuch effect occurs, but all three are hatched together. The young are covered with a thick down, and are perpetually crying for food, which the parents ſhower on them from on high; are ſix weeks before they fly.

The little ſea-ſwallow is but the ſize of a lark; which is its conſtant, and almoſt only diſtinction from the former. There are ſeveral other kinds in foreign parts; but cloſely allied in plumage and manners.

THE TROPIC BIRDS

ARE of natures very different from thoſe which inhabit the extremes of the globe, and to which eternal ſnows are not only familiar, but friendly; theſe, on the contrary, inhabit only the central diviſion of the earth, nor ever quit the torrid zone, where the orb of day ſhines in full ſplendor: hence their appearance is to navigators a certain indication of their approach to the line, and the name of Tropic birds is impoſed on them by general conſent. They are found on the ſea at vaſt diſtances from land, and on iſlands, remote from either continent, as well in the Atlantic Ocean as in the South Seas.

Beſides a powerful and rapid flight, theſe birds have the faculty of repoſing on the water; and perhaps of ſleeping on it. Their feet are entirely united by a membrane; they can perch on trees; they reſemble ſea-ſwallows in their length of wings, which croſs each other over the tail when folded. Are about the ſize of a pigeon; plumage ſtrikingly white; but are at once diſtinguiſhable by a long double ſhaft of feathers, as if a ſtraw was ſtuck in its tail; and from this ſome have given them the name of *ſtraw-tails*. This double ſhaft is compoſed of two thin ſtems, each

each almoſt bare of feathers, and only having ſome ſhort feathery beards. They are prolongations of the two middle feathers of the tail, which is, except theſe, very ſhort, and ſcarce perceptible. Theſe ſhafts are ſometimes two feet long; they are moulted; and the inhabitants of Otaheite, &c. form ornaments of them for the caſques of their warriors; while the Caribbees paſs them through the *ſeptum* of the noſe, either to increaſe their beauty, or their terror.

This bird ſcarce can move on land. There are various ſizes; ſome leſs than a pigeon, ſpotted with black on the wing-feathers next the body; a kind of horſe-ſhoe mark over the eye. Some have red ſhafts, ſome have little ſtreaks of black acroſs the back.

THE PENGUIN KIND

ARE ill fitted for flight, and worſe for walking. Their wings are ſhort, ſcantily furniſhed with quills, and the pinion placed too forward, to be uſefully employed. For this reaſon, the largeſt of the penguin kind, with thick, heavy bodies, cannot fly at all. Their wings ſerve them rather as paddles, when they attempt to move ſwiftly; and in a manner walk along the ſurface of the water. Even the ſmaller kinds ſeldom fly by choice. Their legs are ſtill more aukwardly adapted for walking, all above the knee being hid within the belly; and nothing appears but two ſhort legs ſtuck under the rump, upon which the animal is very aukwardly ſupported. Their ſhort legs drive the body in progreſſion from ſide to ſide; and were they not aſſiſted by their wings, they could ſcarcely move faſter than a tortoiſe; but this poſition of the legs adapts them admirably for a reſidence in water; and theſe birds, like Indian canoes, are the ſwifteſt in the water, by having their paddles in the rear. Nor are they leſs qualified for diving; for by ever ſo little inclining their bodies forward, they loſe their center of gravity, and every ſtroke from their feet tends to ſink them the faſter. In this manner they dive at once to the bottom, or ſwim between two waters, where they continue fiſhing for ſome minutes, and then aſcending, catch an inſtantaneous breath to deſcend again to their operations. If they perceive themſelves purſued, they inſtantly ſink, and ſhew nothing more than their bills. Their lungs are fitted with numerous vacuities, by which they can take in a very large inſpiration; and this probably ſerves them for a length of time.

Of

Of this tribe, the Magellanic penguin is the largeſt, and the moſt remarkable. In ſize it is near a gooſe. It never flies, its wings being very ſhort, covered with ſtiff hard feathers, and always hanging uſeleſsly down by the bird's ſides. The upper part of the head, back and rump, are covered with ſtiff black feathers; while the belly and breaſt are of a ſnowy whiteneſs, except a line of black croſſing the crop. The bill, which from the baſe to about half-way, is covered with wrinkles, is black, but marked croſſwiſe with a ſtripe of yellow. They walk erect, their heads high, their fin-like wings hanging down like arms; ſo that to ſee them at a diſtance, they look like ſo many children with white aprons. From hence they are are ſaid to unite in themſelves the qualities of men, fowls, and fiſhes. Like men, they are upright; like fowls, they are feathered; and, like fiſhes, they have fin-like inſtruments, that beat the water before, and ſerve for all the purpoſes of ſwimming rather than flying. They feed upon fiſh; and ſeldom come aſhore, except in the breeding ſeaſon. In ſome the fleſh is ſo tough, and the feathers ſo thick, that they ſtand the blow of a ſcymitar without injury. A ſmall depreſſion in the earth, without any other neſt, ſerves for their laying. By the warmth of their feathers, and the heat of their bodies, incubation is carried on very rapidly. But in ſome places, the penguin burrows two or three yards deep; in others it clambers up the ledge of a rock, probably in conſequence of dear-bought experience. The egg of the penguin is very large for the ſize of the bird, being generally bigger than that of a gooſe. There are many varieties of the penguin, differing in ſize from that of a Muſcovy duck to a ſwan; the eggs differ in the ſame proportion.

OF THE

AUK, PUFFIN, AND OTHER BIRDS OF THE PENGUIN KIND.

OF a ſize far inferior, but of nearly the ſame form, and exactly the ſame appetites and manners, there is a very numerous tribe.

The great Northern Diver, is nearly the ſize of a gooſe: beautifully variegated all over with many ſtripes, and differs from the penguin, in being much ſlenderer and more elegantly formed. The grey ſpeckled Diver does not exceed the ſize of a Muſcovy duck; and, except in ſize,

The Diver.

greatly reſembles the former. The Auk, which breeds on the iſlands of St. Kilda, chiefly differs from the penguin in ſize and colour. It is ſmaller than a duck; and the whole of the breaſt and belly, as far as the middle of the throat, is white. The Guillemot is about the ſame ſize; it differs from the auk, in having a longer, a ſlenderer, and a ſtraighter bill. The Scarlet-throated Diver may be diſtinguiſhed by its name; and the Puffin or Coulterneb, which is, by its bill, one of the moſt remarkable birds we know. The bill is flat; its edge upwards; of a triangular figure, ending in a ſharp point; the upper chap bent a little downward, where joined to the head; a certain callous ſubſtance encompaſſes its baſe, as in parrots. It is of two colours; aſh-coloured near the baſe, and red towards the point. It has three furrows, or groves, impreſſed in it; one in the livid part, two in the red. The eyes are fenced with a protuberant ſkin, of a livid colour; and they are grey or aſh-coloured. It is a ſmall bird, not much bigger than a pigeon; when it once riſes, it can continue its flight with great celerity.

The auk and guillemot, when they have once laid their ſingle egg, which is extremely large for their ſize, ſeldom forſake it until excluded. The male, who is beſt furniſhed for flight, feeds the female during this interval; and ſo bare is the place where ſhe ſits, that the egg would often roll down from the rock, did not the body of the bird ſupport it. The puffin, relying on its courage, and the ſtrength of its bill, with which it bites moſt terribly, either makes or finds a hole in the ground, where to lay and bring forth its young.

At the latter end of March, or the beginning of April, come over a troop of their ſpies or harbingers, that ſtay two or three days, as it were to view and ſearch out for their former ſituations, and ſee whether all be well. This done, they depart; and about the beginning of May, return again with the whole army of their companions. But if the ſeaſon be tempeſtuous, they undergo incredible hardſhips; and are found, by hundreds, caſt away upon the ſhores, lean and periſhed with famine.

The puffin, when it prepares for breeding, which always happens a few days after its arrival, begins to ſcrape up an hole in the ground, not far from the ſhore; and when it has ſome way penetrated the earth, it then throws itſelf upon its back, and with bill and claws thus burrows inward, till it has dug a hole with ſeveral windings and turnings, from eight to ten feet deep. It particularly ſeeks to dig under a ſtone, where it expects the greateſt ſecurity. In ſome places, where rabbits breed, the puffin diſpoſſeſſes the rabbits, and not unlikely deſtroys their young. Here young

puffins are found in great numbers, and become a very valuable acquiſition to the natives. The old ones, at break of day, leave their neſts, nor do they return till night-fall. Whatever fiſh, or other food, they have procured in the day, by night begins to ſuffer a kind of half digeſtion, and is reduced to an oily matter, which is ejected from the ſtomach of the old ones into the mouth of the young. By this they are nouriſhed, and become fat to an amazing degree. When they are arrived to their full growth, they are dug out, or drawn out, from their burrows, with an hooked ſtick. They bite extremely hard, and keep faſt hold of whatever they ſeize upon.

The Gooſander is a bird, with the body and wing ſhaped like thoſe of the penguin kind, but with legs not hid in the belly. It may be diſtinguiſhed from all others by its bill, which is round, hooked at the point, and toothed, both upper and under chap, like a ſaw. Its colours are various and beautiful: its manners and appetites entirely reſemble thoſe of the Diver. It feeds upon fiſh, for which it dives; and is ſaid to build its neſt upon trees, like the heron and the cormorant.

Of BIRDS of the GOOSE KIND, properly so called.

THE Swan, the Gooſe, and the Duck, leaders of a numerous, uſeful, and beautiful tribe, we have reclaimed from a ſtate of nature, and taught to live in dependance about us. The duck-kind approach the gooſe ſo nearly, that it may be proper to mark the diſtinctions.

The marks of the gooſe are, a bigger body, large wings, a longer neck, a white ring about the rump, a bill thicker at the baſe, ſlenderer towards the tip, with ſhorter legs, placed more forward on the body; both have a waddling walk; but the duck, from the poſition of its legs, is moſt waddling. The duck ſometimes equals a gooſe in ſize, yet there are ſtill other ſufficient diſtinctions. Their having been tamed has produced alterations in each, by which they differ as much from the wild ones of their reſpective kinds as they do among themſelves. In all the gooſe kind the bill is flat and broad, for the purpoſe of ſkimming ponds or lakes of the mantling weeds that ſtand on the ſurface; alſo they are ſheathed with a ſkin which covers them all over. Eat inſects, graſs, corn, &c. Theſe birds do not reject animal food when offered, yet ſubſiſt on vegetables, and ſeldom ſeek any other. They breed in abundance, and lead their

young to the pool the inſtant they are excluded. The ſwan was conſidered as a high delicacy among the ancients, while the gooſe was abſtained from; but the gooſe is now the favourite; and the ſwan ſeldom brought to table, but for oſtentation. At all times the duck was highly eſteemed. There have been many changes wrought in their colours, their figures, and even their internal parts, by human cultivation. Theſe birds, in a wild ſtate, are ſimple in their colourings; but in the tame, no two are exactly alike.

OF THE SWAN, TAME AND WILD.

THE Swan has long been rendered domeſtic; and now we doubt whether there be any of the tame kind in a ſtate of nature: The wild ſwan, though ſtrongly reſembling in colour and form, is yet different; for it is very differently formed within. The wild ſwan is leſs than the tame almoſt a fourth; this weighs twenty pounds, the other only ſixteen; the tame ſwan is all white; the wild bird is, along the back and the tips of the wings, aſh-coloured. In the tame ſwan, the wind-pipe ſinks down into the lungs in the ordinary manner; but in the wild, after a contortion, like what we have ſeen in the crane, it enters a hole in the breaſt-bone; being reflected therein, returns by the ſame aperture; and, being contracted into a narrow compaſs by a broad and bony cartilage, is divided into two branches, which, before they enter the lungs, are dilated into two cavities. It is not eaſy to account for this difference of conformation; but it is more difficult to reconcile the accounts of the ancients with the experience of the moderns, concerning the vocal powers of this bird. The tame ſwan is very ſilent, the wild one has a note extremely loud and diſagreeable; and ſuch is its harſhneſs, that the bird from thence has been called the Hooper. It is probable the ancients had ſome mythological meaning in aſcribing melody to the ſwan.

Its chief food is corn, bread, herbs growing in the water, and roots and ſeeds which are found near the margin. It prepares a neſt in ſome retired part of the bank, and chiefly where there is an iſlet in the ſtream. It is compoſed of water-plants, long graſs and ſticks; and the male and female aſſiſt in forming it with great aſſiduity. The ſwan lays ſeven or eight eggs, white, much larger than thoſe of a gooſe, with a hard, and ſometimes a tuberous ſhell. It ſits near two months; its young are aſh-

coloured when they firſt leave the ſhell, and for ſome months after. It is not a little dangerous to approach the old ones, when their little family are feeding round them. After a twelve-month, which it takes to come to maturity, the young ſwans change their colour with their plumage. Some ſay it lives three hundred years; Willoughby ſeems to believe it. A gooſe, as he juſtly obſerves, has been known to live an hundred; and the ſwan, from its ſuperior ſize, and from its harder, firmer fleſh, may naturally be ſuppoſed to live ſtill longer. We ſee multitudes on the Thames and Trent; but no where greater numbers than on the ſalt water-inlet of the ſea near Abbotſbury, in Dorſetſhire.

Of the GOOSE and its varieties.

THE Gooſe, in its domeſtic ſtate, exhibits a variety of colours. The wild gooſe always retains the ſame marks: the whole upper part is aſh-coloured; the breaſt and belly dirty white; the bill narrow at the baſe, at the tip black; the legs of a ſaffron colour; the claws black. Theſe marks are ſeldom found in the tame, whoſe bill is entirely red, and whoſe legs are entirely brown. The wild gooſe is rather leſs than the tame; but both invariably retain a white ring round their tail, which ſhews that they are both deſcended from the ſame original.

The wild gooſe is ſuppoſed to breed in the northern parts of Europe; and, in the beginning of winter, to deſcend into more temperate regions. They fly at very great heights, in flocks from fifty to an hundred, ſeldom reſting by day. Their cry is frequently heard when they are imperceptible above us; and this ſeems repeated among them, as among hounds in purſuit; but this they ſeldom exert, when they alight. On coming to the ground by day, they range themſelves in a line, like cranes. When they have thus ſat an hour or two, one of them, with a loud long note, ſounds a kind of charge, to which the reſt attend, and they purſue their journey with renewed alacrity. Their flight is very regular: they either go in a line a-breaſt, or in two lines, joining in an angle in the middle. It is thought their flight is thus arranged to cut the air with greater eaſe.

The Barnacle differs from both theſe; being leſs than either, with a black bill, much ſhorter than the preceding.

The

The Brent Gooſe is ſtill leſs. The head, neck, and upper part of the breaſt black; about the middle of the neck, on each ſide, are two ſmall ſpots or lines of white, which together appear like a ring.

Theſe, and many other varieties, are found in this kind. The tame gooſe is the moſt prolific, having leſs to fear, leading a ſecurer and more plentiful life: the wild gooſe ſeldom lays above eight eggs, the tame often above twenty. The female hatches with great aſſiduity; the gander viſits her twice or thrice a day, and ſometimes drives her off to take her place, where he ſits with great ſtate and compoſure. But beyond that of all animals is his pride when the young are excluded: he ſeems then to conſider himſelf as a champion, not only obliged to defend his young, but alſo to keep off the ſuſpicion of danger; he purſues dogs and men that never attempt to moleſt him; and, though the moſt harmleſs thing alive, is then the moſt petulant and provoking.

Of gooſe-feathers moſt of our beds in Europe are compoſed. Great numbers of geeſe are kept tame in the fens in Lincolnſhire, and are plucked once or twice a year. The down of the ſwan is brought from Dantzic. The ſame place alſo ſends us great quantities of the feathers of the cock and hen; but Greenland, Iceland, and Norway, furniſh the beſt feathers of all; and in this number we may reckon the Eider down.

OF THE DUCK AND ITS VARIETIES.

THE tame Duck is the moſt eaſily reared of all our domeſtic animals. The inſtincts of the young direct them to their favourite element; and though conducted by a hen, they deſpiſe her clamorous admonitions. The duck ſeems to be an heedleſs, inattentive mother; ſhe frequently leaves her eggs till they ſpoil; is equally regardleſs of her young; ſhe leads them to the pond, and thinks ſhe has ſufficiently provided for her offſpring when ſhe has ſhewn them the water.

The wild duck differs, in many reſpects, from the tame; and in them there is ſtill greater variety than among the domeſtic kinds. Of the tame duck there are not leſs than ten different ſorts; and of the wild, Briſſon reckons

reckons above twenty. The moſt obvious diſtinction between wild and tame ducks is in the colour of their feet; thoſe of the tame duck being black, thoſe of the wild duck yellow.

Sea-ducks, which feed in the ſalt-water, and dive much, have a broad bill, bending upwards, a large hind toe, and a long blunt tail. Pond-ducks, which feed in plaſhes, have a ſtraight and narrow bill, a ſmall hind toe, and a ſhort pointed train.

In this tribe, we may rank, as natives of our own European dominions, the EIDER DUCK, which is double the ſize of a common duck, with a black bill; the VELVET DUCK, not ſo large, with a yellow bill; the SCOTER, with a knob at the baſe of a yellow bill; the TUFTED DUCK, adorned with a thick creſt; the SCAUP DUCK, leſs than the common duck, bill greyiſh blue; the GOLDEN EYE, a large white ſpot at the corners of the mouth, reſembling an eye; the SHELDRAKE, the bill a bright red, ſwelling into a knob; the MALLARD, which is the ſtock from whence our tame breed has probably been produced; the PINTAIL, the two middle feathers of the tail three inches longer than the reſt; the POCHARD, the head and neck bright bay; the WIDGEON, bill lead-coloured, plumage on the back marked with narrow black and white undulated lines, but beſt known by its whiſtling ſound; the TEAL, the ſmalleſt of this kind, bill black, head and upper part of the neck bright bay.

The moſt noted foreigners of the tribe are, the Muſcovy, or, more properly, the MUSK DUCK, ſo called from a ſuppoſed muſky ſmell; with naked ſkin round the eyes; native of Africa. The BRASILIAN DUCK, the ſize of a gooſe, all black except the tips of the wings. The American WOOD DUCK, with a variety of beautiful colours, and a plume of feathers that falls from the back of the head like a friar's cowl. To theſe might be added many others.

All theſe live in the manner of our domeſtic ducks, keeping in flocks in the winter, and flying in pairs in ſummer, bringing up their young by the water-ſide, and leading them to their food as ſoon as out of the ſhell. Their neſts are uſually built among heath or ruſhes, not far from the water; and they lay twelve, fourteen, or more eggs before they ſit. Their neſts are ſometimes on the tops of trees; generally compoſed of the longeſt graſs, mixed with heath, and lined with the birds' own feathers. In proportion as the climate is colder, the neſt is more artificially made, and more warmly lined with a layer of long graſs and clay; within that another of

moſs,

The Oftrich.

moſs, and, laſtly, a warm coat of feathers or down. The eider duck is particularly remarkable for the warmth of its neſt. The inſide lining, on which the eggs are depoſited, is the ſofteſt, warmeſt, and lighteſt ſubſtance with which we are acquainted. This is the inſide down which covers the breaſt of the bird in the breeding-ſeaſon. This the female plucks off with her bill. The natives watch the place where ſhe begins to build, and, ſuffering her to lay, take away both eggs and neſt. Not diſcouraged by this diſappointment, ſhe builds and lays in the ſame place a ſecond time; and this they alſo take away: the third time ſhe builds, but the drake muſt ſupply the down from his breaſt to line the neſt with; and, if this be robbed, they forſake the place, and breed there no more. They are in general birds of paſſage, and moſt probably perform their journeys acroſs the ocean, as well on the water as in the air.

Ducks flying in the air are often lured down by the loud voice of the mallard below. Nature ſeems to have furniſhed this bird with very particular faculties for calling. The wind-pipe, where it begins to enter the lungs, opens into a kind of bony cavity, where the ſound is reflected as in a muſical inſtrument, and is heard a great way off. To this call all the ſtragglers reſort. Though a timorous bird, yet they are eaſily deceived. Above thirty thouſand have been ſent up, in one ſeaſon, from ten decoys in the neighbourhood of Wainfleet.

THE OSTRICH.

THE Oſtrich is the largeſt of birds; ſome brought into England were ſeven feet high. The head and bill ſomewhat reſemble thoſe of a duck; and the neck that of a ſwan; but is much longer; the legs and thighs reſemble thoſe of an hen; from its ſize and appearance the Arabians call it the *Camel-bird*. From the back to the ground four feet; the head and neck three. From the top of the head to the rump, when the neck is ſtretched out, ſix feet; the tail about a foot; a wing, without the feathers, a foot and a half; with the feathers, three feet. The plumage generally black and white; ſome grey. The greateſt feathers are at the extremities of the wings and tail, generally white. The next row is black and white; the ſmall feathers, on the back and belly, are ſome white, others black; no feathers on the ſides, on the thighs, nor under the wings. The lower part of the neck, about half way, is covered with ſtill

ſmaller feathers than thoſe on the belly and back; and of different colours. All theſe feathers are of the ſame kind, peculiar to the oſtrich; as ſoft as down, utterly unfit for flying or defence. The feathers of other birds have the webs broader on one ſide than the other, but thoſe of the oſtrich have their ſhaft exactly in the middle. The upper part of the head and neck are covered with very fine clear white hair, that ſhines like the briſtles of a hog; and in ſome places there are ſmall tufts of it, conſiſting of about twelve hairs, which grow from a ſingle ſhaft, about the thickneſs of a pin. At the end of each wing, there is a kind of ſpur almoſt like the quill of a porcupine; an inch long, hollow and horny. There are two of theſe on each wing; the largeſt at the extremity of the bone of the wing, the other a foot lower. The neck ſeems more ſlender by being void of feathers. The ſkin is of a livid fleſh colour; the orifice of the ears bare, but a little hair within it. The bill is ſhort and pointed, and two inches and an half at the beginning. In form, the eye is ſomewhat like the human, the upper eye-lid immovable, having eye-laſhes; the tongue is ſmall, very ſhort; in ſome about an inch long, and very thick at the bottom. In others half an inch, and a little forked at the end. The thighs are very fleſhy and large, covered with a white ſkin, inclining to redneſs, and wrinkled in the manner of a net, whoſe meſhes will admit the end of a finger. Some have very ſmall feathers here and there on the thighs; and others neither feathers nor wrinkles. The legs are covered in front with large ſcales; the foot has two very large toes, covered with ſcales. The largeſt, on the inſide, is ſeven inches long, including the claw, which is near three-fourths of an inch in length, and almoſt as broad. The other toe, four inches long, has no claw.

The internal parts are no leſs ſurpriſingly peculiar. On the breaſt, under the ſkin, the fat is two inches thick; on the fore-part of the belly, thicker, and as hard as ſuet in ſome places. It has two ſtomachs: The firſt, which is lowermoſt, ſomewhat reſembles the crop in other birds; is conſiderably larger than the other, and furniſhed with ſtrong muſcular fibres, as well circular as longitudinal. The ſecond ſtomach, or gizzard, is always filled with a variety of diſcordant ſubſtances; hay, graſs, barley, beans, bones, ſtones. The kidneys are not, as in other birds, divided into lobes. The heart and lungs are ſeparated by a midriff, as in quadrupeds; and other parts bear ſtrong reſemblance.

Native of the torrid regions of Africa, never known to breed out of that country, formed to live in ſands and deſerts, where few vegetables clothe the earth, and where rain is unknown. Here oſtriches are

ſeen

ſeen in large flocks, which, to the diſtant ſpectator, appear like a regiment of cavalry.

The oſtrich is, of all animals, the moſt voracious; devours any thing that is given, and digeſts all that is digeſtible; what the ſtomach cannot ſoften, paſſes whole. In their native deſerts they live chiefly on vegetables, inoffenſive and ſocial, the male, as Thevenot aſſures us, aſſorting with the female with connubial fidelity. Lay very large eggs, ſome above five inches in diameter, and weighing five pounds, having a very hard ſhell. In the northern parts of Africa, about the beginning of July; in the ſouth, about the latter end of December. Are very prolific; lay thirty to forty eggs at once. In thoſe hot climates, there is no neceſſity for continual incubation; and the female frequently leaves her eggs by day, but broods over them by night; yet probably this varies with the temperature of the air, &c. In temperate climates the young are unable to walk for ſeveral days after they are hatched. During this time, the old ones are very aſſiduous in ſupplying and defending them; when brought forth, they are aſh-coloured the firſt year, and covered with feathers all over.

Some ſavage nations of Africa hunt them for their fleſh, or breed them tame to eat the young ones, hence called Struthophagi, or Oſtrich-eaters. The eggs are ſaid to be well-taſted, and extremely nouriſhing; and a ſingle egg ſufficient for eight men.

Of all known animals that uſe their legs in running, the oſtrich is by far the ſwifteſt: when purſued at a diſtance, he begins to run at firſt but gently; his wings, like two arms, working with a motion correſpondent to that of his legs; his ſpeed would very ſoon ſnatch him from the view of his purſuers; but, inſtead of going off in a direct line, he takes his courſe in circles; the hunters making a ſmall courſe within, relieve each other, and keep him thus employed, two or three days together, till ſpent with fatigue and famine. Sometimes he defends himſelf with his beak, his wings, and his feet: Such is the force of his motion, that a man would be utterly unable to withſtand him in the ſhock.

THE TOUYOU

IS chiefly found in Guiana, along the banks of the Oroonoko, in the inland provinces of Braſil and Chili, and the vaſt foreſts that border on the mouth of the river Plata; though not ſo large as the oſtrich, is only

ſecond to it in magnitude; by much the largeſt bird in the New Continent: at full growth ſix feet high; its legs are three feet long; its thigh is near as thick as that of a man. The toes differ from thoſe of the oſtrich, as there are three in the American bird, and but two in the former. Its neck is long, its head ſmall, and bill flatted like the oſtrich; but, in other reſpects, it more reſembles a Caſſowary. The form of the body appears round; the wings are ſhort, and unfit for flying; has no tail, but is covered on the back and rump with long feathers, which fall backward, and cover the anus: theſe feathers are grey on the back, and white on the belly. It is very ſwift, and ſeems aſſiſted in its motion by a kind of tubercle behind, like an heel, upon which, on plain ground, it treads very ſecurely, but not on a deſcent; in its courſe it uſes a very odd kind of action, lifting up one wing, which it keeps elevated for a time, till, letting it drop, it liſts up the other; whether as a ſail to catch the wind, or as a rudder to turn its courſe, to avoid the arrows of the Indians, remains to be aſcertained: however this be, the emu runs with ſuch ſwiftneſs, that the fleeteſt dogs are thrown out in the purſuit. One of them, finding itſelf ſurrounded by the hunters, darted among the dogs with ſuch fury, that they made way to avoid its rage; and it eſcaped, by its amazing velocity, in ſafety to the mountains.

When the young ones are hatched, they are familiar, and follow the firſt perſon they meet. I have been followed myſelf, ſays Wafer, by many of theſe young oſtriches, which at firſt are extremely harmleſs and ſimple, but as they grow older, they become more cunning and diſtruſtful; and run ſo ſwift, that a greyhound can ſcarcely overtake them. Their fleſh, in general, is good to be eaten; eſpecially when young. Their maintenance could not be expenſive, if, as Narborough ſays, they live entirely upon graſs.

The lateſt account we have of this bird is by Captain Tench, in his account of Botany Bay, which we ſhall give in his own words.

"The bird which principally claims attention is a ſpecies of oſtrich, approaching nearer to the Emu of South America than any other we know of. One of them was ſhot, at a conſiderable diſtance, with a ſingle ball, by a convict employed for that purpoſe by the governor; its weight, when complete, was ſeventy pounds, and its length from the end of the toe to the tip of the beak, ſeven feet two inches, though there was reaſon to believe it had not attained its full growth. On diſſection many anatomical ſingularities were obſerved: the gall-bladder was remarkably large, the liver not bigger than that of a barn-door fowl, and after the

ſtricteſt

ſtricteſt ſearch no gizzard could be found; the legs, which were of a vaſt length, were covered with thick, ſtrong ſcales, plainly indicating the animal to be formed for living amidſt deſarts; and the foot differed from an oſtrich's by forming a triangle, inſtead of being cloven." Goldſmith, whoſe account of the Emu is the only one I can refer to, ſays, 'that it is covered from the back and rump with long feathers, which fall backward, and cover the anus; theſe feathers are grey on the back, and white on the belly.' "The wings are ſo ſmall as hardly to deſerve that name, and are unfurniſhed with thoſe beautiful ornaments which adorn the wings of the oſtrich: all the feathers are extremely coarſe, but the conſtruction of them deſerves notice; they grow in pairs from a ſingle ſhaft, a ſingularity which the author I have quoted has omitted to remark. It may be preſumed, that theſe birds are not very ſcarce, as ſeveral have been ſeen, ſome of them immenſely large; but they are ſo wild, as to make ſhooting them a matter of great difficulty. Though incapable of flying, they run with ſuch ſwiftneſs, that our fleeteſt greyhounds are left far behind in every attempt to catch them. The fleſh was eaten, and taſted like beef."

This gentleman confounds the names Touyou and Emu, as others have before him; whereas the Emu is properly the Caſſowary of Java.

THE CASSOWARY

WAS firſt brought into Europe by the Dutch, in 1597, from Java, in the Eaſt Indies, in which part of the world it is only found; the natives call it *Eme* or *Emu*. Next to the preceding, the largeſt and heavieſt of the feathered ſpecies: the Caſſowary, though not ſo large as the former, appears more bulky; its body being nearly equal, and its neck and legs much thicker and ſtronger in proportion.

It is five feet and an half long, from the point of the bill to the extremity of the claws. The legs are two feet and an half high, from the belly to the end of the claws. The head and neck together are a foot and an half; and the largeſt toe, including the claw, is five inches long. The claw alone of the leaſt toe, is three inches and a half in length. The wing is ſo ſmall, that it does not appear, being hid under the feathers of the back. All the feathers are of the ſame kind, and outwardly of the ſame colour. They are generally double, having two long ſhafts, which grow out of a ſhort one, which is fixed in the ſkin. Thoſe that are double are always of unequal lengths; ſome fourteen inches long, particularly on the rump; while

while others are not above three. The beards that adorn the ſtem or ſhaft are, from about half way to the end, very long, and as thick as an horſe-hair, without being ſubdivided. The ſtem or ſhaft is flat, ſhining, black, and knotted below, and from each knot proceeds a beard; likewiſe, the beards at the end of the large feathers are perfectly black, and towards the root of a grey tawny colour; ſhorter, more ſoft, and throwing out fine fibres, like down; ſo that nothing appears except the ends, which are hard and black; becauſe the other part, compoſed of down, is quite covered. There are feathers on the head and neck; but they are ſo ſhort, and thinly ſown, that the bird's ſkin appears naked, except toward the hinder part of the head, where they are a little longer. The wings, when deprived of their feathers, are but three inches long; their feathers are like thoſe on the body. The ends of the wings have five or more prickles, of different lengths and thickneſs, which bend like a bow: hollow throughout, having only that ſlight ſubſtance within which all quills have. The longeſt of theſe prickles is eleven inches; a quarter of an inch in diameter at the root, being thicker there than towards the extremity; the point ſeems broken off.

The part moſt remarkable is the head; it is bare, and in a manner armed with an helmet of horny ſubſtance, that covers it from the root of the bill to near half the head backwards. This helmet is black before, and yellow behind. Its ſubſtance is very hard, being formed by the elevation of the bone of the ſkull; and it conſiſts of ſeveral plates, one over another, like the horn of an ox. The eye is a bright yellow, and the globe, being above an inch and an half in diameter, gives it an air fierce and extraordinary. At the bottom of the upper eye-lid is a row of ſmall hairs, over which is another row of black hair, which looks pretty much like an eye-brow. The lower eye-lid, which is the largeſt, is furniſhed alſo with plenty of black hair. The hole of the ear is large, open, and uncovered, ſurrounded with ſmall black hairs. The ſides of the head, about the eye and ear, having only a few hairs of covering, are blue, except the middle of the lower eye-lid, which is white. The part of the bill which anſwers to the upper jaw in other animals, is very hard at the edges above, and the extremity of it like that of a turkey-cock. The end of the lower mandible is ſlightly notched, and the whole is of a greyiſh brown, except a green ſpot on each ſide. As the beak admits a very wide opening, this contributes not a little to the bird's menacing appearance; the tongue an inch long. The neck is of a violet colour, inclining to that of ſlate; is red behind in ſeveral

places, but chiefly in the middle. About the middle of the neck before, at the riſe of the large feathers, there are two proceſſes, round at the bottom, formed by the ſkin, which reſemble ſomewhat the gills of a cock, but are blue as well as red. The ſkin, which covers the fore-part of the breaſt, on which this bird leans and reſts, is hard, callous, and bare. The thighs and legs are covered with feathers, and are extremely thick, ſtrong, ſtraight, and covered with ſcales of ſeveral ſhapes; but the legs are thicker a little above the foot than in any other place. The toes are likewiſe covered with ſcales, and are three in number: the claws are of a hard ſolid ſubſtance, black without, and white within.

The internal parts are equally remarkable. The caſſowary unites the double ſtomach of animals that live upon vegetables, the ſtomachines of thoſe that live upon fleſh. The heart is very ſmall, being [illegible] inch and an half long, and an inch broad at the baſe.

It never attacks others; and inſtead of the bill, when attacked makes uſe of its legs, and kicks like an horſe, or runs against the aſſailer, beats him down, and treads him to the ground. The manner of going of this animal is not leſs extraordinary than its appearance. Inſtead of going directly forward, it ſeems to kick up behind with one leg, and then making a bound onward with the other, it goes with ſuch prodigious velocity, that the ſwifteſt racer would be left far behind. Swallows every thing that comes within the capacity of its gullet. It is ſaid, that the paſſage of the food is performed ſo ſpeedily, that ſometimes the eggs it has ſwallowed are whole paſs unbroken: the alimentary canal of this animal, as we have obſerved above, is extremely ſhort; and it may happen that many kinds of food are indigeſtible in its ſtomach, as wheat or currants are to many birds ſwallowed whole.

The caſſowary's eggs are of a grey aſh colour, inclining to green, not ſo large nor ſo round as thoſe of the oſtrich. They are marked with a number of little tubercles of a deep green, and the ſhell is not very thick. The largeſt of theſe is found to be fifteen inches round one way, and about twelve the other. The ſouthern parts of the Indies ſeem the natural climate of the caſſowary. His domain, if we may ſo call it, begins where that of the oſtrich terminates. The latter has never been found beyond the Ganges; while the caſſowary is never ſeen but in the iſlands of Banda, Sumatra, Java, the Molucca Iſlands and the correſponding parts of the continent. Yet even there is rare.

THE DODO.

ITS body is maſſive, almoſt round, covered with grey feathers; juſt barely ſupported on two ſhort thick legs like pillars, while its head and neck riſe from it in a manner truly groteſque. The neck, thick and purſy, is joined to the head, which conſiſts of two great chaps, that open far behind the eyes, which are large, black and prominent; ſo that the animal, when it gapes, ſeems to be all mouth. The bill is of an extraordinary length, not flat and broad, but thick, and of a bluiſh white, ſharp at the end, and each chap crooked in oppoſite directions. They reſemble two pointed ſpoons laid together by the backs. From all this reſults a ſtupid and voracious phyſiognomy; which is ſtill more increaſed by a bordering of feathers round the root of the beak, and which gives the appearance of an hood or cowl, and finiſhes this picture of ſtupid deformity. Bulk, which in other animals implies ſtrength, in this only indicates inactivity. The dodo ſeems weighed down by its own heavineſs, and has ſcarce ſtrength to urge itſelf forward. It is furniſhed with wings, covered withe ſoft aſh-coloured feathers, but they are too ſhort to aſſiſt it in flying. It is furniſhed with a tail, with a few ſmall curled feathers; but this tail is diſproportioned and diſplaced. Its legs are too ſhort for running, and its body too fat to be ſtrong.

This bird is native of the iſle of France; and the Dutch, who firſt diſcovered it there, called it in their language the *nauſeous bird*, as well from its diſguſting figure, as from the bad taſte of its fleſh: however ſucceeding obſervers contradict this firſt report, and aſſert that its fleſh is good and wholeſome eating. It is a ſilly, ſimple bird, as may be very well ſuppoſed from its figure, and is very eaſily taken. Three or four dodos are enough to dine an hundred men.

Whether the dodo be the ſame bird with that which ſome travellers have deſcribed under the bird of the Iſle of Nazareth, remains uncertain. The country is the ſame; their incapacity of flying is the ſame; the form of the wings and body is ſimilar; the chief difference is in the colour of the feathers, which, in the female of the bird of Nazareth, are ſaid to be extremely beautiful; and in the length of their legs, which in the dodo are ſhort, in the other are deſcribed as long.

SURVEYS OF NATURE.

PART THE FIFTH.

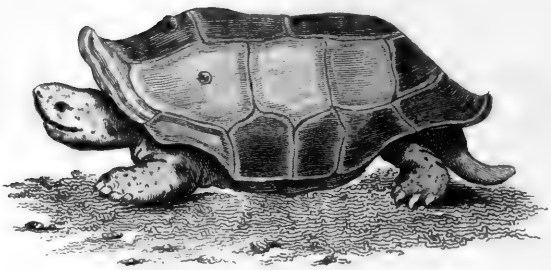
OVIPAROUS QUADRUPEDS may juſtly claim a ſtation after the ſuperior orders of viviparous quadrupeds, and birds: endowed with leſs powers in certain reſpects, yet exhibiting much diverſified contrivance, adaptation, and manners. Many perſons have given the general name of REPTILE to this whole diviſion; but that ſeems more properly applied to ſerpents, or ſuch as uſe their belly to aſſiſt their motion.

This claſs of creatures have neither breaſts, nor hair; but are clothed with a bony covering, hard or ſharp ſcales, and tubercles more or leſs prominent, or with a naked ſkin, bedewed with a viſcous liquid. They have ſhort legs; and, inſtead of ſpreading their feet when walking, they fold them.

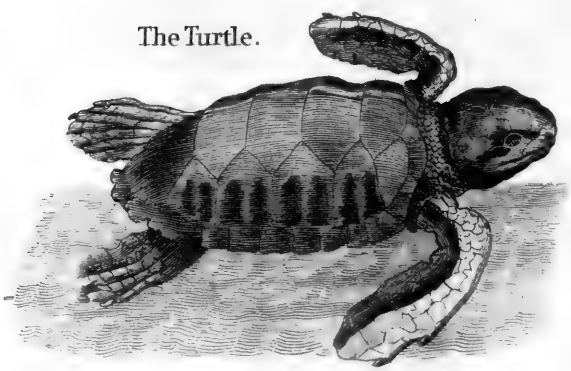
The moſt conſiderable are natives of the torrid zone; yet their blood is leſs endued with heat, than that of moſt other animals: they have alſo a leſs quantity of blood; it circulates ſlowly, and but little depends on the lungs. Many of them have no ribs; many have only four *vertebræ* in the neck, conſequently little motion. Their heart has only one ventricle; their breathing is with intervals, and irregular, often ſuſpended for a long time; they are fond of warmth and of humidity; and though inhabitants of various ſoils, rocky and dry, or ſandy, or of the woods, yet all are amphibious; but cannot continue altogether deprived of air, or remain long under water, like fiſhes. In general ſurvive conſiderable wounds, and even ſeparation of ſome members, which, in certain caſes, are reproduced. They are alſo extremely patient of hunger, and ſome live months without food: Their particles tranſpire but ſlowly, and conſequently require only ſlow renovation. They never ſweat. The major part of them are

torpid, when the atmoſphere is cool, and ſleep during winter; though often, if the ſeaſon be mild, and the cold abated, they revive, and are found active and vigorous, even in winter. Extreme cold converts their torpidity into death. They loſe ſcarce any of their weight during their torpid ſtate; on their recovery, their external covering uſually changes, and till their new attire is ſufficiently hardened, they are greatly concealed, and ſolicitous of avoiding the riſque of accidents. They are often found in troops; but their aſſembling is not the reſult of ſocial, but of individual intereſt. They are in general very prolific, and often the largeſt kinds, eſpecially, in which they contradict the rule adopted in reſpect to viviparous quadrupeds. Their eggs are never hatched by the parent; but, though not left open to accidents (being hidden, &c.) yet neglected; and conſequently the poſterity never knows its parent, nor experiences the tender cares neceſſary to avert or to ſoften the accidents of life. Moſt of them may be tamed, crocodiles not excepted. In general, they have more or leſs of a muſky ſcent. They may be conſidered as uſually very long-lived. Few of them are venomous.

The Tortoiſe.



The Turtle.



THE TORTOISE.

TORTOISES may be divided into thoſe that live upon land, thoſe of freſh waters, and thoſe of the ſea; the former being called Tortoiſes, the laſt Turtles, but all are amphibious; the land-tortoiſe will live in water, and water-tortoiſes on land; they are therefore rather named from the reſidence they prefer, than from being reſtricted to either.

Tortoiſes, in external form, pretty much reſemble each other; their covering is compoſed of two great ſhells, a ſuperior and inferior, only touching at the ſides: the ribs, and the ſpine of the back, form part of the upper; the lower unites to the ſternum. The lower is the leaſt, the ſofteſt, and often almoſt flat. Theſe ſhells are compoſed of ſeveral pieces, bound together at the edges by very ſtrong and hard ligaments, with a ſmall ſhare of motion in ſome kinds. At each end of theſe united ſhells is an aperture, one for a ſmall head, ſhoulders and fore-legs, to paſs through; the other for the hind feet and the tail. Theſe ſhells the animal never quits; but they ſerve for his defence, and are a very ſubſtantial and adequate defence. The upper ſhell has commonly thirteen or fifteen centre-pieces, and a border round them of twenty-two or twenty-five ſmaller. The under ſhell has, in ſome kinds, twelve or fourteen pieces, in others twenty-two or twenty-four. Theſe coverings often weigh four hundred pounds in the marine kinds.

The tortoiſe has a ſmall head, a little rounded at the muzzle, where are the noſtrils; the mouth is beneath, opens to beyond the ears; the place of which is ſcarcely diſtinguiſhable; no teeth, but two bony ſerrated ridges in their place: theſe gather and grind its food. Such is the amazing ſtrength of the jaws, it is impoſſible to open them where they once have faſtened; even, when the head is cut off, the jaws ſtill keep their hold; and the muſcles, in death, preſerve a tenacious rigidity. The legs, though ſhort, are inconceivably ſtrong; and it has been known to carry five men ſtanding on its back with apparent eaſe.

The blood circulates in this animal, as in ſome cartilaginous fiſhes, by a very ſhort paſſage through the circulation; and the lungs ſeem to lend only occaſional aſſiſtance. From this conformation the animal can ſubſiſt ſome time without breathing.

The land-tortoiſe, from the uſe of its feet in walking, is much more nimble on land than the ſea-turtle: if thrown on its back, by rocking

and balancing its body, at laſt it turns itſelf on its face again; which the turtle, when once turned, is unable to do. The nails on the toes of thoſe long uſed to ſcratch for ſubſiſtence, or to burrow on land, are blunt and worn; while thoſe employed in ſwimming only, are ſharp and long. The brain of the land-tortoiſe is but ſmall; yet three times as large as that of the turtle. They differ in the ſhape of their eggs, and in the paſſage by which they are excluded; in the land-tortoiſe, the paſſage is ſo narrow, that the egg conforms to its ſhape; and, though round when in the body, yet becomes oblong when excluded. This paſſage is wider in the turtle, and therefore its eggs are round. Turtles may readily be diſtinguiſhed from tortoiſes, by their very long feet, often two feet long; their toes unequal in length, and united by a membrane, being rather fins than feet. The tortoiſe hardly exceeds three feet long, by two feet broad; ſome kinds not many inches; the turtle is ſometimes from five to ſeven feet long. Size, however, is a fallacious diſtinction; ſince land tortoiſes, in ſome parts of India, grow to a very great magnitude, five or more feet long; though probably not, as the ancients affirm, big enough for a ſingle ſhell to ſerve for the covering of an houſe.

Moſt tortoiſes can put out, or withdraw at pleaſure, their head, feet, and tail under the great penthouſe of the ſhell; there, ſecure from all attacks, defended on every ſide, it fatigues the patience, and defies the claws or beak of the moſt formidable animal of the foreſt. This the turtle cannot do ſo completely. As theſe creatures live wholly on vegetable food, they never ſeek encounters; yet, if any of the ſmaller animals attempt to invade their repoſe, they are ſure to ſuffer: for impregnably defended, furniſhed alſo with prodigious ſtrength of jaw, wherever the tortoiſe faſtens, it infallibly keeps its hold, till it has taken out the piece.

Is extremely tenacious of life; the loſs of a member is but a ſlight injury; it will live long, though deprived of its brain, or its head. Redi cut off the head of a tortoiſe, and the animal lived twenty-three days after its ſeparation from the body. The head alſo continued to rattle the jaws, like a pair of caſtanets, for above a quarter of an hour. Tortoiſes commonly exceed eighty years: there was one kept in the Archbiſhop of Canterbury's garden, at Lambeth, that was above an hundred and twenty. It was at laſt killed by the ſeverity of a froſt, from which it had not ſufficiently defended itſelf in its winter retreat, which was a heap of ſand at the bottom of the garden.

The

The tortoiſe lives on vegetables ſometimes, ſnails, or worms; is fond of fruits; and, when the foreſt affords them, is generally found not far from where they grow. As it moves but ſlowly, is not very delicate in the choice of food. Thoſe kept in domeſticity will eat any thing; leaves, fruits, corn, bran, or graſs.

Tortoiſes are torpid like the bat, the ſerpent, the mole, and the lizard; and when food is no longer in plenty, happily become inſenſible to the want: is ſometimes buried two or three feet in the ground, its hole furniſhed with moſs, graſs, and other ſubſtances, as well to keep the retreat warm, as to ſerve for food, in caſe it ſhould prematurely awake. From this dormant ſtate the tortoiſe is liberated by the genial return of ſpring; not much waſted by its long confinement.

The eggs of tortoiſes are furniſhed with a yolk and a white; but the ſhell is ſomewhat like thoſe ſoft eggs that hens exclude before their time; yet much thicker and ſtronger. The tortoiſe lays but few; the turtle depoſits from an hundred and fifty, to two hundred, in a ſeaſon. When it prepares to lay, the female ſcratches a hole in the earth, generally in a warm ſituation, where the beams of the ſun have their full effect; there depoſiting her eggs, and covering them with graſs and leaves, ſhe forſakes them, to be hatched by the heat of the ſeaſon. The young are generally excluded in about twenty-ſix days; but this varies, as heat is more or leſs abundant. The little animals no ſooner leave the egg, than they ſeek for proviſion; their ſhell, with which they are covered from the beginning, expands, and grows larger with age.

LAND TORTOISES.

THE moſt common is that called the GRECIAN: dwells in woods, and elevated lands. Is among the ſloweſt of oviparous quadrupeds; reſembles, in many reſpects, the freſh-water tortoiſes. Thoſe on the mountains larger than thoſe on the plains: about fourteen inches long, ten broad. A *nictitating membrane* to the eye; the under eye-lid only moveable; tail ſhort; membraned feet; puts its feet very ſlowly to the ground, one toe (or rather nail) only at a time, till the whole

touch the ground. Thirteen ſcales compoſe the centre of the upper ſhell; the border has twenty-four, larger in proportion than uſual among tortoiſes. The ſhell is greatly *globated* in form. Is more or leſs torpid, according to the ſeaſon. Quit their retreats in ſpring, when the ſexes ſeek each other. Lay in June four or five eggs, white, like thoſe of the pigeon, in a hole; the heat of the ſun hatches them in September. Never frequent the water. Is found in moſt temperate countries. Is good eating. In South-America dogs are trained to hunt tortoiſes, and to bay them till the hunters arrive.

That whoſe upper ſhell is very convex, and its ſcales alſo, each of its ſcales being in a manner *ſtellated* by yellow rays from its centre, where is a ſix-ſided ſpot, yellow alſo, is a curious kind. There are ſeveral other kinds, of much the ſame manners. One has its upper ſhell, as it were, *ſhagreened* in the middle; ſome are reddiſh; ſome blackiſh; ſome have a protuberance on the head, vermilion colour and yellow. Of the ſmall kinds the eagles take advantage, by carrying them great heights in the air; then letting them fall on the hard rocks, whereby their ſhells are broken, and the bird can feed on them.

FRESH-WATER TORTOISES

DIFFER from ſea-turtles in having ſmaller feet; toes more apparent, but membraned; five before, four behind; a tail half as long as the body, and always extended when the creature is walking. Are found in moſt temperate countries in Europe, alſo in Aſia, India, Japan, &c. Cannot ſupport rigorous cold; ſleeps even in temperate expoſures; in a hole in the earth, which is often a month's work to make. Early in ſpring changes this dwelling for the water, where it is fond of ſun-ſhine; in ſummer is moſtly on land, where ſhe lays, placing her eggs in a hole, covered with ſand. The young ſcarcely exceed half an inch in length; at maturity, are eight or nine inches long; breadth three or four; they are long ere they reach this length. Feed on ſnails, and inſects without wings: are very deſtructive of the ſmaller fry of fiſh, and even bite the larger, till, weakened with loſs of blood, they become their prey. Often rejects the air-bladder of fiſh; where many of theſe are ſeen ſwimming, a tortoiſe may be ſuſpected of having taken up his abode.

There

There are ſeveral kinds; among them, one whoſe tail has a hooked kind of nail, reſembling the ſting of a ſcorpion, which has given him his name.

Among the moſt remarkable is the *ſoft-ſhelled* tortoiſe; much the largeſt of thoſe inhabiting freſh water. Inhabits Carolina; the upper ſhell brown, the middle of it hard, ſtrong, and bony; but the ſides, eſpecially the hind part, cartilaginous, ſoft, pliant like tanned leather, eaſily yielding to any form, yet thick and ſtrong enough to protect the wearer: little riſings ſcattered over the ſhell. The under ſhell is projected, in front, two or three inches before the upper, ſo that the animal might lay his head on it; ſoft and pliant here, but hard and bony behind. Head ſmall; a *nictitating membrane* to the eye; the noſtrils placed in a kind of projecting ſnout, ſoft, tender, and ſomewhat tranſparent. The feet ſtrong and thick; five toes before; the three firſt ſtrong, ſhort, and having hooked nails: beyond the fifth, two falſe toes, ſerving to extend a large membrane, which unites them all. The ſame conformation in the hind feet, but only one falſe toe. This creature is ſtrong, wild, and, when attacked, riſes on its hind-feet, and throws itſelf furiouſly on its enemy, biting violently. Is good eating.

SEA TORTOISES, OR TURTLE.

OF all animals of the kind, the GREEN TURTLE is the moſt noted, and the moſt valuable. The delicacy, the ſalubrity, the nutritive qualities of its fleſh, and its eaſy digeſtion, were long known to our ſeamen, and to the inhabitants of the coaſts where they are native. And this aliment is the more acceptable, as being found beneath the burning zone. Dampier, that rough ſeaman, who has added more to natural hiſtory than half the philoſophers before him, appears to be the firſt who informed us of their diſtinctions; and that the green turtle was chiefly prized for its fleſh.

This animal is called green, from the colour of its ſhell, and in ſome the fleſh. It is generally ſix or ſeven feet long, three or four broad, three or four thick in the middle, weighing two or three hundred weight; though ſome are from five to eight hundred, and others not above fifty. Do not acquire their entire dimenſions under twenty years. Its upper ſhell is oval, ſurrounded by a border of ſeparate pieces; the largeſt furtheſt from the head; roundiſh in part. The middle of the ſhell is com-

poſed of fifteen pieces; of which ſome or other are often falling off by accidents of various kinds; the number and form of theſe vary. The under ſhell is ſhorter than the upper, and ſofter; compoſed commonly of twenty-three or twenty-four pieces. Its feet are very long; the toes united by a membrane, and much more uſed for ſwimming than for walking. In the hind feet, the firſt toe only has a ſharp and viſible nail: that of the ſecond is leſs, and round; the three others very ſlight. In the front feet, the two interior toes have ſharp nails, and the three others ſlight ones; the head, feet, and tail have ſmall ſcales like a fiſh; the mouth opens behind the ears; has no teeth, but jaws very hard and ſtrong; and inſtead of teeth, bony aſperities: theſe are powerful enough to craunch ſhell-fiſh of any kind; which they eat frequently.

We are told by Laet, that on the Iſle of Cuba they grow ſo large, that five men can ſtand on the back of one of them; and, what is more ſurpriſing, that the animal will go off with them upon its back, with a ſlow ſteady motion, towards the ſea. They are found in great numbers on the Iſland of Aſcenſion.

Its chief food is the alga, a ſubmarine plant, that covers the bottom of ſeveral parts of the ſea not far from the ſhore. There they are ſeen, when the weather is fair, feeding in great numbers, like flocks of ſheep, ſeveral fathoms deep upon the verdant carpet below. At other times they go to the mouths of rivers, and they ſeem to find gratification in freſh-water and freſh air. When done feeding, they generally float with their heads above water, unleſs alarmed, when they ſuddenly plunge to the bottom. They often ſeek proviſion among the rocks, eating moſs and ſea-weed; and probably inſects and ſmall animals, as they are very fond of fleſh when taken and fed for the table.

They couple in March; are during nine days almoſt incapable of ſeparation. At breeding time, which varies on each ſide the line, they take ſometimes a voyage of eight or nine hundred miles to depoſit their eggs on ſome favourite ſhore. The coaſts they always reſort to are low, flat, and ſandy; for being heavy animals, they cannot climb a bold ſhore; nor is any bed ſo proper as ſand to lay their eggs on. Here the female is ſeen toward ſun-ſet drawing near the ſhore, and looking earneſtly about her. If ſhe perceives danger, ſeeks another place: if not ſhe lands at dark, and ſurveys the ſand, where ſhe deſigns to lay; then retires without laying; but the next night returns to depoſit part of her burthen. She begins by working and digging in the ſand with her fore-feet, till ſhe has made ſometimes ſeveral round holes, a foot broad, and two feet deep, juſt

juſt above high-water-mark. She lays ninety or an hundred eggs at a me, as big as an hen's egg, and round as a ball. The white of theſe eggs is ſaid not to harden by heat, though the yolk does. She continues laying about an hour; during which time, nothing can diſturb her. The eggs are covered with a tough white ſkin, like wetted parchment. When ſhe has done laying, ſhe covers the hole very lightly, but ſo dexterouſly that it is not an eaſy matter to diſcover it, and leaves her eggs to be hatched by the heat of the ſun. At the end of fifteen days, in ſome places; in others, three weeks, ſhe lays about the ſame number of eggs again; and again, at the end of another fifteen days, uſing the ſame precautions every time. In about twenty-four or twenty-five days, the young turtles, being about two or three inches long, burſt from the ſand, as if earth-born, and crawl directly to the ſea, inſtinctively: but often, their ſtrength being ſmall, the ſurges beat them back on the ſhore; expoſed a prey to thouſands of birds, crocodiles, tigers, &c. that then haunt the coaſts. Fiſhermen alſo ſeize as many young as they can, to breed up in incloſed places free to ſalt water. Of the whole brood ſcarce one in thirty lives to any ſize. When the turtles have done laying, they return to their accuſtomed places, weak, lean, and unfit to be eaten.

In theſe uninhabited iſlands, to which the green turtle chiefly reſorts, the men that go to take them land about night-fall, and ſilently (for theſe animals, though without any external opening of the ear, hear very diſtinctly, there being an auditory conduit that opens into the mouth), lie cloſe while they ſee the female turtle coming on ſhore. They let her proceed to her greateſt diſtance from the ſea; and, when ſhe is buſily employed in ſcratching a hole, they ſally out and ſurpriſe her. Their manner is to turn her upon her back, which utterly incapacitates her from moving; and yet, as the creature is very ſtrong, claſps the ground very faſt, and ſtruggles very hard, two men or more find it no eaſy matter; then they go to the next; and thus, in leſs than three hours, they have been known to turn forty or fifty turtles, each weighing an hundred and fifty, or two hundred pounds. There are ſeveral other ways of taking them; one is, to ſeize them when coupled together; another is ſtriking them by the harpoon, when on the ſurface of the water, or at the bottom; another is, by diving, coming up beneath, and ſeizing it by the tail; the animal awaking, ſtruggles to get free, and by this both are kept afloat till the boat arrives to take them in.

The TRUNK TURTLE is commonly larger than the reſt, and its back higher and rounder. The fleſh of this is rank, and not wholeſome.

The LOGGERHEAD is ſo called from the ſize of its head, which is much bigger in proportion than that of the other kinds. The fleſh of this is alſo very rank, oily, hard, and not eaten but in caſe of neceſſity. Yields an oil uſeful to preſerve ſhips from worms; its hind feet, as well as its front feet, have two ſharp nails among the toes; is bold, and even voracious; is ſaid to ſeize young crocodiles by the tail, when in narrow paſſages, and bite it off. Eats fiſh, and cracks the largeſt ſhell-fiſh; fights hard when attacked.

The HAWKSBILL is the leaſt, and has a long and ſmall mouth. The fleſh of this is often dangerous eating; but the ſhell ſupplies the tortoiſe-ſhell, of which ſuch variety of beautiful trinkets are made. The ſhells of other turtles are porous; but this is firm, and, when poliſhed, is beautifully marbled. They generally weigh three or four pounds; ſometimes ſix or eight pounds. The ſhell conſiſts commonly of thirteen leaves, or plates, placed like ſlates on the roofs of houſes, of which eight are flat, and five hollow; the border has twenty-five. They are raiſed and taken off by means of fire made under the ſhell, after the fleſh is taken out. As ſoon as the heat affects the leaves, they ſtart from the ribs, and are eaſily raiſed with the point of a knife. Being ſcraped and poliſhed on both ſides, they become beautifully tranſparent; or eaſily take any form, by making them ſoft and pliant in warm water, and then ſcrewing them in a mould, like a medal: however, the ſhell is moſt beautiful before it undergoes this laſt operation.

Is found in Aſia as well as America; lays its eggs rather in gravel than ſand; when turned on its back, can recover its feet.

The GREAT MEDITERRANEAN TURTLE, which ſhould rather be called the *leather-coated turtle* from its covering, is from five to eight feet long, and from ſix to nine hundred pounds weight; but is unfit for food, and ſometimes poiſonous. The ſhell, which is a tough ſtrong integument, reſembling an hide, is unfit for ſervice. One of theſe, taken in 1729, at the mouth of the Loire, was of enormous ſtrength, and by its ſtruggles involved in the nets; it appeared at firſt terrible to the fiſhermen; but finding it impotent, they dragged it on ſhore, where it made a moſt horrible bellowing; and, when they began to kill it with their gaffs, was to be heard at half a mile's diſtance. They were ſtill further intimidated by its nauſeous and peſtilential breath, which ſo powerfully affected them, that they were near fainting. This turtle wanted but four inches of eight feet

feet long, two feet broad: its ſhell reſembles leather, and it is ſaid it had teeth in each jaw, one rank behind another, like thoſe of a ſhark; its feet alſo wanted claws; the tail was quite diſengaged from the ſhell, fifteen inches long, more reſembling that of a quadruped than a tortoiſe. Two or three have been taken on the coaſts of Cornwall, in the year 1756, the largeſt of which weighed eight hundred pounds.

One, moſt probably of this kind, was caught about thirty years ago near Scarborough, and a good deal of company was invited to feaſt upon it; a gentleman, who was one of the gueſts, told the company that it was a Mediterranean turtle, and not wholeſome; but a perſon who was willing to ſatisfy his appetite at the riſque of his life, eat of it: he was ſeized with a violent vomiting and purging; but his conſtitution overpowered the malignity of the poiſon.

OF LIZARDS.

THIS tribe is the moſt numerous of thoſe which form the order of oviparous quadrupeds, exceeding fifty ſpecies. They may eaſily be diſtinguiſhed from others, by not having a ſhell as tortoiſes; yet having a tail, which frogs and toads have not: they are clothed with ſcales, more or leſs ſtrong, or tubercles, more or leſs prominent. The forms and dimenſions of their tail vary greatly; in ſome round, in others flat; in ſome extremely long, in others very ſhort. With reſpect to ſize, no claſs has its ranks ſo oppoſite from the ſmall Cameleon, an inch long, to the Alligator of the river Amazons, above twenty-ſeven feet. They are found of a hundred different hues, green, blue, red, cheſnut, yellow, ſpotted, ſtreaked, and marbled. The lizard would often pleaſe by its colours; but there is ſomething in the animal's figure, counteracting the brilliancy of its ſcales, or the variety of its ſpots, giving an air of exquiſite venom, or great malignity. The figure of theſe animals is not leſs various: ſometimes ſwollen in the belly; ſometimes at the throat; ſometimes with a ſet of ſpines on the back; ſometimes with teeth; ſometimes without; ſome venomous, others harmleſs, or philanthropic: ſome are viviparous, ſome oviparous. Some bring forth ſmall ſpawn, like fiſhes. The larger kinds bring forth eggs, which are hatched by the heat of the ſun. The ſalamanders come forth alive, perfect and active; but thoſe bred in water, and, as we ſuppoſe, from ſpawn, ſuffer

a very conſiderable change in their form. They are produced with an external ſkin or covering, that ſometimes incloſes their feet, and gives them a ſerpentine appearance: to this falſe ſkin fins are added, above and below the tail, that ſerve the animal for ſwimming; but when the falſe ſkin drops off, theſe drop alſo; and then the lizard, with its four feet, is completely formed, and forſakes the water.

They may be diſtinguiſhed into the larger kind, or CROCODILES, &c. with flatted tails; the GUANOS, which have ſpines on their backs; the *green* or *common lizard* kind, whoſe tails are round, and their bellies ſcaly; then thoſe which have ſcaly feet; thoſe which have only three fingers; and thoſe with wings; after which, thoſe properly known by the name of *Salamanders*.

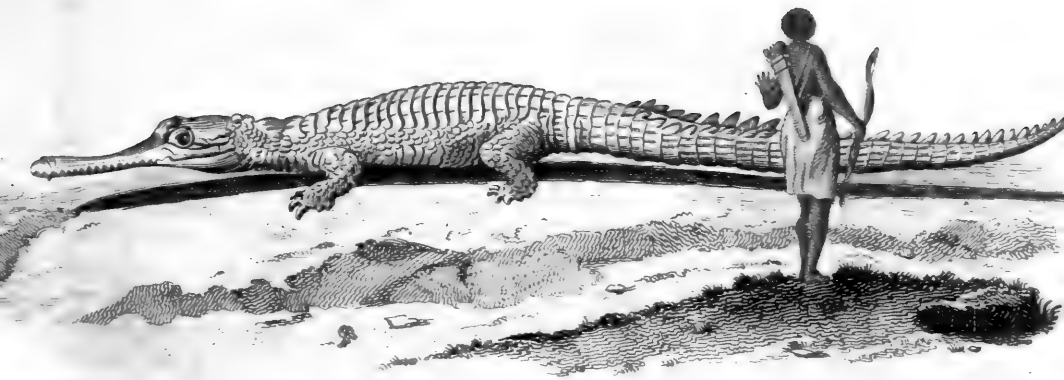
All have many points of ſimilitude, in figure and colour; the whole tribe is eaſily diſtinguiſhed, and ſtrongly marked. All have four ſhort legs; tails almoſt as thick as the body at the beginning, and generally tapering. All are amphibious; and formed internally like the tortoiſe, &c.

THE CROCODILE.

TRUE crocodiles have five fingers to their front feet, four to the hind foot, which is membraned, and nails only to the three interior toes of each foot. They have four glands, which furniſh a ſtrong muſky ſmell.

To view this animal in all its terrors, of an enormous ſize, in ſurpriſing numbers, and committing unceaſing devaſtations, we muſt explore the uninhabited regions of Africa and America, the banks of thoſe immenſe rivers that roll through extenſive waſtes, the midſt of marſhy lakes, and drowned ſavannas, and among the banian trees of their ſides; where arts have never penetrated, where force only makes diſtinction, and the moſt powerful exert their ſtrength with moſt confidence and ſecurity. In the river Amazons, or the river Niger, they are found in hundreds, from eighteen to twenty-ſeven feet long, lying as cloſe as a raft of timber upon one of our ſtreams. They are here covered with mud; they indolently baſk on the ſurface, undiſturbed at the approach of an enemy, ſince, from repeated trials of their ſtrength, they find none beyond their power to ſubdue.

Of



The Crocodile

Of this terrible animal there are three kinds; the Green Crocodile, Cayman, or Alligator; for in figure and nature theſe are the ſame: the Black Crocodile; and that of the Ganges.

This animal is ſometimes found thirty feet long; its moſt uſual length is eighteen or twenty. In one of this length, the tail exceeds five feet; the head and neck near three feet; the circumference five feet. The fore legs reſemble the arms of a man, both within and without; have five fingers of a conical figure. The hinder legs, including the thigh and paw, two feet two inches; the paws, from the joint to the extremity of the longeſt claws, ten inches; of the four toes, three have large claws, the longeſt two inches; theſe toes are united by a membrane, like thoſe of a duck, but much thicker. The head is long, at the top a little riſing, the reſt flat, eſpecially towards the extremity of the jaws, covered by a ſkin adhering firmly to the ſkull and jaws. The ſkull is rough and unequal; about the middle of the forehead two bony creſts, two inches high: the ſkull between theſe is proof againſt a muſquet ball. The eye very ſmall, and ſo placed in its orbit, that the outward part, when the lid is cloſed, is only an inch long, running parallel to the opening of the jaws: has a double lid, one within and one without: that within, like the nictitating membrane of birds, folds in the great corner of the eye, is tranſparent. The iris large in proportion to the eyes; yellowiſh grey; the eyes ſparkling, and near each other, placed obliquely. Above the eye is the ear, not unlike in form to a brow. The noſe is in the middle of the upper jaw, near its extremity, perfectly round and flat, two inches in diameter, of a black, ſoft, ſpongy ſubſtance, not unlike the noſe of a dog. The jaws ſeem to ſhut one within another; the under jaw only moves, and only with a ſtraight down motion; twenty-ſeven cutting teeth in the upper jaw, ſometimes thirty-ſix; fifteen in the lower, ſometimes thirty, with ſeveral void ſpaces between them: thick at the bottom, ſharp at the point, of different ſizes, except ten large hooked ones, ſix of which in the lower jaw, and four in the upper; the mouth fifteen inches long, nine in breadth, opens beyond the ears; could eaſily take in the body of a man. The body a dark brown on the upper part, a whitiſh citron below, with large ſpots of both colours on the ſides. From the ſhoulders to the tail a covering of large ſcales, ſquare, fifty-two in number; thoſe near the tail not ſo thick as the reſt. The creature has all over it a coat of armour; not every where proof againſt a muſquet ball, eſpecially under the belly. The gullet large. The tongue a thick, ſpongy, ſoft fleſh, ſtrongly connected to the lower

jaw by a membrane which covers it, and which is pierced in ſeveral places. Sixty-two joints in the back-bone, which, though very cloſely united, have ſufficient play to enable the animal to bend like a bow to the right and the left.

The ſtrength of every part of the crocodile is very great; the ſpine is jointed in the firmeſt manner; the muſcles of the legs are vigorous and ſtrong; its teeth are ſharp, numerous, and formidable; its claws long and tenacious; but its principal inſtrument of deſtruction is the tail: with a ſingle blow of this it has often overturned a canoe, and ſeized on the poor ſavage, its conductor.

Such is this formidable animal, the terror of the moſt navigable rivers, in ſome places lying hours, and days, ſtretched in the ſun, motionleſs; ſo that one not uſed to them might miſtake them for trunks of trees, covered with a rough and dry bark; but the miſtake would ſoon be fatal, if not prevented; for the torpid animal, at the approach of any living thing, darts on it with inſtant ſwiftneſs, and drags it to the bottom. During inundations, they ſometimes enter cottages, and ſeize the firſt animal they meet with. There have been examples of their taking a man out of a canoe, in the ſight of his companions, without the poſſibility of aſſiſtance.

The crocodile ſeldom, except when preſſed by hunger, or intent on depoſiting its eggs, leaves the water. Its uſual method is to float on the ſurface, its noſe above water, and ſeize whatever comes within its reach; if this method fails, it goes cloſer to the bank, and there waits, covered among the ſedges, in expectation of ſome animal that comes to drink; it ſeizes the victim with a ſpring, and bounds very faſt for ſo unwieldy an animal; then drags its prey into the water, and ſinks with it to the bottom. If the creature the crocodile has ſurpriſed eſcapes, the tyrant purſues with all its force, and often ſeizes it a ſecond time, eſpecially if the road be ſtraight and level. Often the crocodile ſeizes a creature as formidable as itſelf, and meets with a moſt deſperate reſiſtance. We are told of frequent combats between the crocodile and tigers; the inſtant they are ſeized, they turn with the greateſt agility, and force their claws into the crocodile's eyes, while he plunges with his fierce antagoniſt into the river. There they continue to ſtruggle for ſome time, till at laſt the tiger is drowned.

We are aſſured by Labat, that a negro, with no other weapon than a knife in his right hand, and his left arm wrapped round with a cow-hide, ventures boldly to attack this animal in its own element. As ſoon

ſoon as he approaches the crocodile, he preſents his left arm, which the animal ſwallows moſt greedily; but ſticking in its throat, the negro has time to give it ſeveral ſtabs under the neck; the water alſo getting in at the mouth, which is held involuntarily open, the creature is ſoon bloated and expires. In Siam it is taken by throwing three or four ſtrong nets acroſs a river. When firſt taken, it employs the tail, which is the grand inſtrument of ſtrength, with great force; but after many unſucceſsful ſtruggles, is at laſt exhauſted; then the natives approach in boats, and pierce him in the tender parts till he is weakened with loſs of blood; then they tie up his mouth, faſten his head to his tail, bending it like a bow, and tie his feet to the top of his back. Thus brought into ſubjection, or bred up young, is uſed to entertain the great men of the Eaſt; often managed like an horſe; a curb is put into its mouth, and the rider directs it at pleaſure.

In Egypt, and other countries, where the inhabitants are civilized, and the rivers frequented, this animal is ſolitary and fearful. Far from attacking a man, it ſinks at his approach with precipitation. In ſome places, inſtead of being formidable, is not only inoffenſive, but cheriſhed. In the river San Domingo, the crocodiles are quiet and gentle; the children play with them, and ride about on their backs; ſometimes even beat them without receiving injury. The inhabitants are very careful of this breed, and conſider them as harmleſs domeſtics.

Crocodile's fleſh is at beſt very bad, tough eating; but unleſs the muſk-bags be ſeparated, it is inſupportable. The negroes themſelves cannot well digeſt the fleſh: but a crocodile's egg is a moſt delicate morſel to them.

Breeds near freſh waters. To depoſit her brood, the female always pitches on an extenſive ſandy ſhore, ſhelving to the water, for the greater convenience of acceſs, and near the edge of the ſtream, that the young may have a ſhorter way to the water. The preſence of a man, a beaſt, or a bird, deters her at that time; and ſhe infallibly returns. If all is ſafe, ſhe begins by ſcratching up the ſand with her fore-paws, and making a hole pretty deep. There ſhe depoſits her eggs, of the ſize of a tennis-ball, covered with a tough white ſkin like parchment. Lays twice or thrice, at ſome days interval, from twenty to twenty-four eggs at each laying. Begins in April. She covers them cloſe up in the ſand, and they are vivified by the heat of the ſun in about thirty days. The young crocodile is folded on itſelf in the egg; about ſix or ſeven inches long. They quickly avail themſelves of their liberty; and run to

the water; where the whole brood is ſcattered into different parts. By far the greateſt number are deſtroyed, not only by voracious fiſhes, but by old crocodiles preſſed with hunger; the reſt find ſafety in their agility or minuteneſs.

The eggs of this animal are eagerly ſought by every beaſt and bird of prey; including monkies, and ſeveral kinds of water-birds. The ichneumon was deified by the ancients for its ſucceſs in deſtroying theſe eggs. At preſent the vulture, called Gallinazo, is their moſt prevailing enemy. Hiding in the thick branches of the trees, that ſhade the banks of the river, they watch the female in ſilence, and permit her to lay all her eggs without interruption. When ſhe has retired, flocking all together on the hidden treaſure, they tear up the eggs, and devour them in much leſs time than they were depoſited.

Thoſe between the tropics are lively the whole year; thoſe diſtant from them are more or leſs torpid in winter. The crocodile lives probably much above an hundred years, as it does not attain its full growth under thirty.

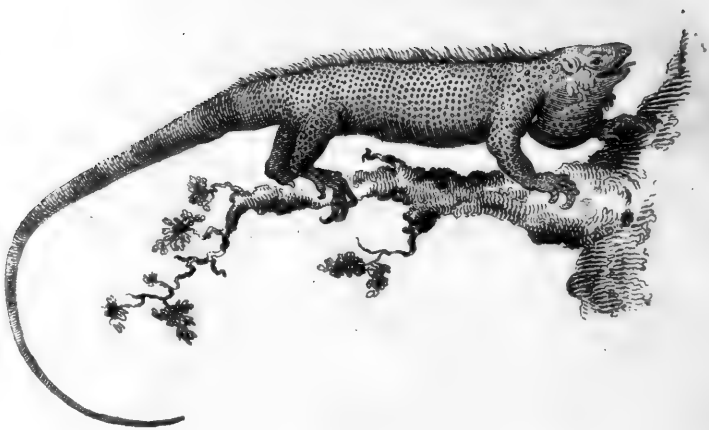
The *Black Crocodile* is found in the river of Senegal; its ſnout is longer than the former; its manners and ferocity yet more ſavage.

The crocodile of the Ganges reſembles the firſt in colour; its jaws are very long and narrow, its teeth more numerous; its manners much the ſame.

THE WHIP-TAIL

IS ſo named, not from the reſemblance of its tail to a whip in form, but in motion; vibrating very rapidly. This lizard inhabits the hot climates in America, particularly Peru: is often ſeveral feet in length; his tail is ſomewhat dentelated on the ſides, is flatted; its feet membraned, like the crocodile, but he has five toes to each foot. One of the iſland of Ceylon drives off invaders, by beating them violently with his tail, which he ſhakes like a whip.

THE



The Guano.

THE FORKED-TONGUED LIZARD

HAS often been miſtaken for a young crocodile, or cayman, which he greatly reſembles in general, from having a large throat, tubercles on the back, and a flatted tail; colour deep ruſty yellow, mingled with greeniſh; but he has five toes to each foot, and they are not membraned, but very much ſeparated from each other; each having alſo a nail, ſharp and crooked. His tongue being divided, and extremely mobile, gives him a reſemblance to ſerpents; in the rapid motions of his tail he reſembles the whip-tail, by which name he has ſometimes been called. Inhabits South-America. Is capable of climbing trees, by its toes being ſeparated; is fond of water, but frequents the woods, and there preys. Its fleſh good to eat; and its eggs ſought after.

THE IGUANA.

THE Iguana may be known at once by a large protuberant ſkin beneath his throat, and by a range of elevated ſpines which runs down his back, and part of his throat, formed of very long and ſharp ſcales, placed vertically; higheſt on the back, and gradually diminiſhing to the tail, which is round. The iguana is from five to ſeven feet long; the body about as thick as one's thigh: the ſkin of the body, tail, and feet is covered with ſmall ſcales; thoſe of the head extremely poliſhed and luſtrous. The eyes are large, ſeem but half opened, except when the animal is angry; then they appear large and ſparkling; the opening for the ear is large: both jaws are full of very ſharp teeth; the bite is dangerous, though not venomous, for it never lets looſe till killed, or violently ſtruck on the noſe. The male has a ſkin hanging under his throat, which reaches down to his breaſt; when diſpleaſed, he puffs it up like a bladder: he is one-third larger and ſtronger than the female. The males are aſh-coloured, or yellow, mingled with green, and the females are often a very beautiful green. The toes are ſeparated; five to each foot; nails ſtrong and hooked. In the front feet, the interior toe has but one joint, the

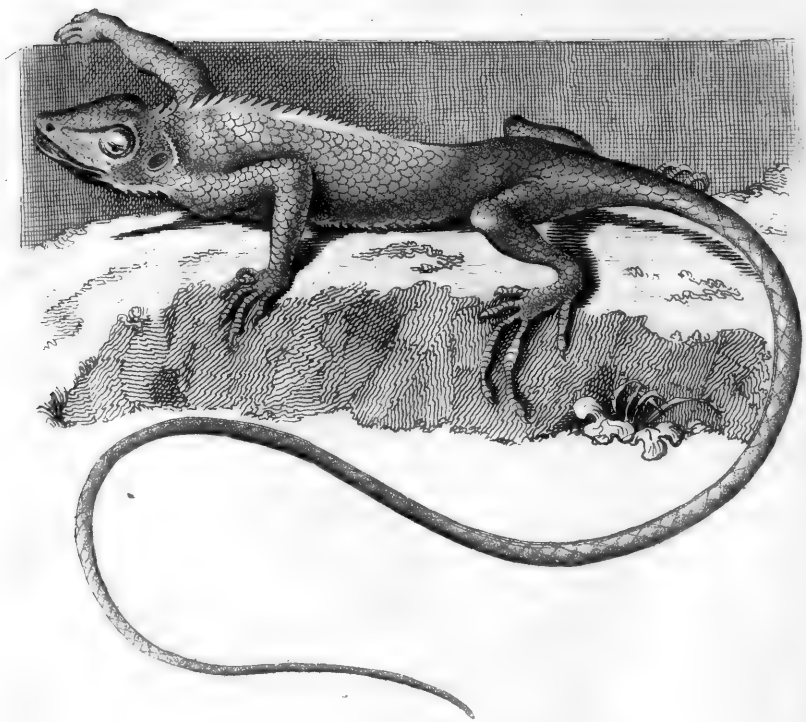
ſecond two, the third three, the fourth four, the fifth two: the ſame in the hind foot; but the fifth toe has three.

The fleſh, eſpecially of the females, is the greateſt delicacy of Africa, America, or India; the ſportſmen of theſe ſultry climates go out to hunt the iguana, as we do the pheaſant or hare, in the beginning of the ſeaſon, when the great floods of the tropical climates are paſt, and vegetation ſtarts into univerſal verdure. This animal is the moſt harmleſs creature of all the foreſt, except when defending its female. About two months after the cloſe of winter, the female quits the woods to lay her eggs on the ſands of the ſea-ſhore, always an odd one, from thirteen to twenty-five; the ſhell ſupple, like thoſe of the turtle; the contents whitiſh, no glair; they are thought of exquiſite reliſh. It lives on vegetables and inſects among the trees, or ſports in the water, without offering to offend: there, having fed upon the flowers of the *mahot*, and the leaves of the *mapou*, that grow along the banks of the ſtream, it repoſes on the branches that hang over the water. Swims badly; its feet folded cloſe to its body; its tail only moving, and driving it forward: But on land is ſwift. When in poſſeſſion of a tree, ſeems conſcious of ſecurity, and never offers to ſtir. There the ſportſman finds it, and faſtens his nooſe round its neck; if the head be placed ſo that the nooſe cannot readily be faſtened, by hitting the animal a blow on the noſe with a ſtick, it lifts the head, and offers it in ſome meaſure to the nooſe; or its attention is caught by whiſtling, and it lifts up its head; as it will, if tickled by the nooſe. May be domeſticated; lives in the garden; is active during night; ſees well in obſcurity, and eaſily catches nocturnal inſects. In walking he often darts out his tongue; he lives eaſy, and becomes familiar. Colours vary according to climate, age, and ſex.

THE BASILISK

IS very far removed from that imaginary creature, whoſe ſight was mortal, and whoſe ſubſtituary repreſentations are made by awkward and extraordinary contorſions of the Spiny Ray; a fiſh which is no monſter, till made ſuch by art. This lizard inhabits South America; has a very high

row



The Galeote.

row of creſt-like ſcales down his back, in the form of rays, a little ſeparated from each other; he has alſo a kind of hood on his head; he lives among trees, climbing eaſily; alſo by ſwelling his hood with air, and puffing up his whole dimenſions, he becomes much lighter than before; leaps, and as it were flies from branch to branch; the ſame extenſion of his parts he uſes when ſwimming. When repoſed, tempering his natural vivacity, he ſeems pleaſed with being inſpected; and gently agitates his creſt, raiſing and falling it; which, by the different reflections of his ſcales, has a pretty effect. Often exceeds three feet long.

THE GALEOTE

HAS a creſt from his head to the middle of his back, formed of ſcales, ſeparate, large, thin, and pointed: his head is flat, very broad behind; eyes large; opening for the ears large; the throat a little ſwelled; feet long, and toes alſo, which are widely ſeparated from each other. The tail is tapering, and three times as long as the body. Is but ſmall. Some are azure on the back; whitiſh on the belly. Found in Aſia, the Iſle of Ceylon, Arabia, and Spain. Lives in the houſes, on the roofs; feeds on ſpiders, and ſome ſay on young rats; and fights with ſmall ſerpents, as do many other lizards.

THE GREY LIZARD

IS the gentleſt, moſt innocent, and moſt uſeful of its kind; is the commoneſt alſo. Its motions are lively, and its courſe rapid. Is fond of the heat of the ſun; is not afraid of man, nor ſhuns him, but looks at him: yet at the leaſt noiſe is frighted, and diſappears. Has five toes to each foot; his back is grey, with whitiſh ſpots, and has three long ſtreaks, of almoſt black, running down it; his belly is greeniſh changing to blue; his throat has a kind of collar, of ſeven gold-coloured ſcales: belly is covered with ſcales, larger than thoſe on the upper parts, forming croſs

bands, five or ſix inches long. Does not bite when taken, but ſoon becomes familiar: was called by the ancients the Friend of Man. Its tail is very fragile; nearly twice as long as the body; ſpotted black and white; ſometimes *re-ſhoots* a part mutilated. Feeds on inſects, eſpecially thoſe which infeſt the garden or the field; to ſeize them, darts its tongue; which is large, forked, and has little aſperities, ſcarce ſenſible, yet enough to hold its winged prey. Can live long without food; is torpid in cold weather. The female lays her eggs in the warmeſt expoſure; they are round, ſcarce half an inch in diameter, are hatched by the warmth of the atmoſphere. This lizard quits his ſkin, after his awaking from ſleep; and alſo before he enters on his torpid ſtate.

THE GREEN LIZARD

IS conſidered by LINNÆUS as a variety of the grey, but is much larger, and more ſhewy in its colours, which appear in perfection when it has acquired its new covering in ſpring. In the hot countries is ſometimes thirty inches long; is of the ſame gentle manners as the former.

THE CAMELEON

IS a very extraordinary animal; is from eleven to fourteen inches long; delights to ſit on trees, being afraid of ſerpents, from which it is unable to eſcape on the ground; is very gentle and inoffenſive, but ſaid to be always fearful or angry. This report is probably unfounded.

The head is flat at top; and on the ſides: two riſings originate from the noſe, paſs immediately over the eyes, and unite behind the head; where they meet a third coming from its ſummit, and two others coming from the chaps. The neck is ſhort; the noſtrils are at the end of the muzzle; the mouth is often ſo cloſely ſhut, that the ſeparation of the lips is ſcarce diſcernible. No opening is found for the ears; its hearing therefore very imperfect; has no teeth, but bony ridges; the lips divide beyond the jaws; the tongue reſembles an earth-worm, five or

The Camelion.

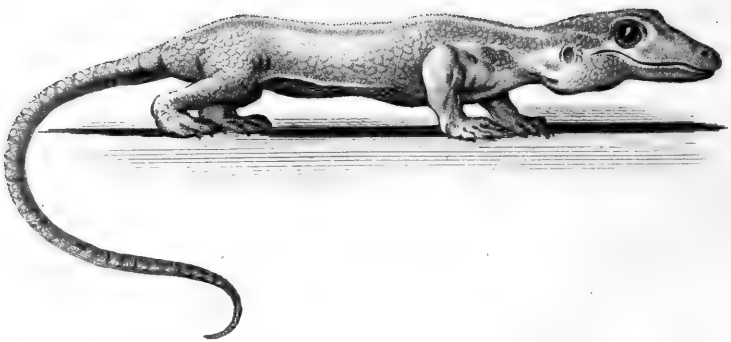
ſix inches long, ending in a kind of a thick knot, hollow, attached to a kind of ſpike, which enters into its cavity, and which it *ſheaths*, when drawn on to it; it has a viſcous liquid on it, which holds flies and other inſects, on which the cameleon feeds; this he darts rapidly. Can live long (almoſt a year ſay ſome) without eating; he has no voice, but a kind of hiſs when ſurpriſed. The eyes ſtand out of the head: they have a ſingle eye-lid, ſhagreened like the reſt, attached to the eye, and following its motion, through a crevice in which the ſight of the eye appears, which is of a ſhining brown; and round it is a little circle of a gold colour; the animal often moves one eye, when the other is at reſt; ſometimes one will look directly forward, the other backward; one upward, the other downward. Has five very long toes on each foot; nails ſtrong and hooked; the ſkin of the legs extends to the ends of the toes, and unites them together, yet ſo that they are divided into two parcels, one of three toes: the other two in the front foot the exterior parcel has the two toes; in the hind foot the interior has the two toes. He is not fond of water; but by this conformation of his feet he eaſily gripes ſmall branches of trees; for his further ſecurity, his tail is prehenſile, and ſerves as a fifth hand. When he changes place, and attempts to deſcend from an eminence, he moves with the utmoſt precaution, advancing one leg very deliberately before the other, ſtill ſecuring himſelf, by holding whatever he can graſp with his tail.

The head of a large cameleon is two inches long; from thence, to the beginning of the tail, four or five: the tail five inches, the feet two and a half: the body differs in thickneſs, at different times; ſometimes, from the back to the belly, it is two inches, ſometimes but one, for it can expand or contract itſelf at pleaſure, not only throughout the back and belly, but alſo the legs and tail. The cameleon is often thus blown up for two hours together; then it becomes leſs and leſs, inſenſibly; for the dilatation is always more quick and viſible than the contraction. In its contracted ſtate, the animal appears extremely lean; the ſpine of the back ſeems ſharp, and all the ribs may be counted; the tendons of the legs and arms may be ſeen very diſtinctly. This method of puffing itſelf up is ſimilar to that in pigeons, whoſe crops are ſometimes greatly diſtended with air. The cameleon has a power of driving the air it breathes from its lungs over every part of the body, tail and legs, between the ſkin and muſcles; the muſcles themſelves are never ſwoln. The ſkin is very cold to the touch; and though the animal ſeems ſo lean, there

there is no feeling the beating of the heart. The ſkin is ſtrewed with little riſings, and has a grain not unlike ſhagreen, but very ſoft, becauſe each eminence is as ſmooth as if it were poliſhed. Some of theſe little protuberances are as large as a pin's head, on the arms, legs, belly, and tail; but on the ſhoulders and head they are of an oval figure, and a little larger; thoſe under the throat are ranged in the form of a chaplet, from the lower lip to the breaſt. The colour of all theſe eminences, when the cameleon is at reſt in a ſhady place, is of a blueiſh grey, and the ſpace between is of a pale red and yellow.

But when the animal is removed into the ſun, the whole ſurface of the ſkin ſoon ſeems to imbibe the rays of light; and its ſimple colouring changes into a variety of beautiful hues. Wherever the light comes on the body it is of a tawny brown; but that part of the ſkin on which the ſun does not ſhine changes into ſeveral brighter colours, pale yellow, or vivid crimſon, which form ſpots of the ſize of half one's finger: ſome of theſe deſcend from the ſpine half way down the back; and others appear on the ſides, arms and tail. When the ſun is withdrawn, or in the ſhade, the original grey colour returns by degrees, and covers all the body. Sometimes the animal becomes all over ſpotted with brown ſpots of a greeniſh caſt. When it is wrapped up in a white linen cloth for two or three minutes, the natural colour becomes much lighter; but not quite white, as ſome authors have pretended. The cauſe of theſe ſpots is by ſome thought to be fear, or heat, agitating its humours; for in the cold they are leſs vivid, and when dead very pale: others think the animal ſubject to a kind of jaundice, and theſe are effected by its bile.

Le Bruyn, during his ſtay at Smyrna, bought ſeveral, and kept four in a cage, permitting them at times to run about the houſe. The freſh ſea-breeze ſeemed to give them moſt ſpirits and vivacity; they opened their mouths to take it in; he never perceived that they eat any thing, except now and then a fly, which they took half an hour to ſwallow; he obſerved their colour often to change, three or four times ſucceſſively, without being able to find out any cauſe for ſuch alterations; their common colour he found to be grey, or rather a pale mouſe-colour; but its moſt frequent changes were into a beautiful green, ſpotted with yellow: ſometimes the animal was marked over with dark brown; and this often changed into a lighter brown. Some colours, however, it never aſſumes; but moſtly affects thoſe neceſſary to its preſervation; ſuch as the green



The Gecko.

green of trees, their bark, &c. where it lies concealed by its close similarity.

Lays nine to twelve eggs, oval and of supple shell. Inhabits all hot countries, Mexico, Africa, Ceylon, &c. On the banks of the Senegal, and the Gambia, is the object of veneration: the Negroes do not kill them; but when they are dead they eat them. There are some small variations (principally on the head) among them; but in general the race is pretty uniform.

THE WOOD SLAVER, OR SPUTATOR,

IS a lizard of two inches long, of which the tail is half; whitish under the belly, grey on the body: striped crosswise with deep brown; four bands of this deep colour cross the head and back; another smaller borders the upper jaw; six others form so many rings round the tail. There is no apparent opening for the ears: the tongue is broad, flat, and a little divided at the extremity: black spots on the summit of the head, and the muzzle; the feet are varied with grey, black, and white; five toes to each foot; scaly beneath, terminating in a kind of ball or scaly shell, without any sensible nail. Inhabits the hot countries of America, in houses, and carpenters' yards; hurts nobody, if not disturbed; but must be inspected with caution, as he is easily irritated. He runs along the walls, and if frightened he gets as near as he can to his enemy, and ejects against him a kind of black spittle, so venomous, that a drop of it swells the part on which it falls; the swelling is cured by camphorated spirit of wine or brandy, which is used in America against the sting of scorpions; this spittle may be seen gathering in the corners of the creature's mouth sometimes, when he is angry. Seldom quits his hole but by day.

THE GECKO

IS among the most extraordinary animals, by the general diffusion of its venom. In form, has a slight resemblance to the cameleon; his head

almoſt triangular; is large in proportion to his body; his eyes large, tongue flat, covered with ſmall ſcales, and the top indented; teeth ſharp, and ſo ſtrong, ſays BONTIUS, that they make impreſſions on the hardeſt ſubſtances, even ſteel. This animal is entirely covered with little warts, more or leſs riſing; beneath the thighs is a row of tubercles, elevated and hollow: the feet are remarkable by oval ſcales, more or leſs indented in the middle, as large as the ſurface of the toes, regularly diſpoſed one over another, like the ſlates upon houſes: has nails to all its toes except the firſt. The tail longer than the body, covered with rows of ſcaly rings. General colour clear green, ſpotted with ſcarlet; his name imitiates his cry, eſpecially when rain is expected. Found in Egypt, India, Amboyna, the Molucca Iſles. Hides in half rotten trees, and humid places; ſometimes viſits houſes, where he ſpreads general conſternation, and is quickly deſtroyed. BONTIUS aſſerts, his bite is ſo venomous, that unleſs the part wounded be cut off, or burnt, it is mortal in a few hours. The touch of his feet is very dangerous, and is ſaid by ſome to poiſon proviſions on which he walks. Some think this proceeds from his urine, which is very corroſive; others, that it is a ſweat proceeding from the hollow tubercles beneath his thighs; his blood, and a kind of foam which ſtarts from his mouth, when angry, are conſidered as mortal venoms, and furniſh the inhabitants of Java a poiſon for their arrows. HASSELQUIST affirms, that the feet depoſit a poiſon; that the creature is fond of ſubſtances impregnated with ſalt, and, by walking over them, leaves behind him a dangerous poiſon. He ſaw at Cairo three women nearly killed, by having eaten cheeſe lately ſalted, on which the Gecko, had depoſited his poiſon. He ſaw alſo one of theſe lizards run over the hands of a man who endeavoured to take him: where he had trodden, was covered with little puſtules, redneſs, heat, and ſome pain, like nettle-ſtings. It may be that this quality varies according to climate, ſeaſon, &c. In the night this lizard croaks ſomewhat like a frog, which diſcovers his approach. After rain, he comes out of his retreat; walks ſlowly; eats ants and worms. The female lays oval eggs; covers them ſomewhat with earth, and the ſun hatches them. Is ſuppoſed to be the *Tockaie* of Siam. Exceeds a foot in length.

There are one or two other lizards not unlike this in form; but whether in manners alſo, accounts have not determined.

The Chalcide.

The Fluted. *Biped-Reptile.*

THE SEPS.

THE Seps muſt be cloſely examined, to be diſtinguiſhed from a ſerpent; as the opening for its ears is ſcarce diſcoverable, nor its legs. Eyes ſmall. The Seps ſeems to make one in that particular group which ſeparates the lizard from the ſerpent race. It has four legs, like the lizard, but very ſhort, under an inch, ſometimes ſcarce a quarter of an inch; and a long ſlender body, which it rolls round on itſelf, like the ſerpent. The fore legs are very near the head; the hind legs are placed far backward; the animal moves them briſkly, and perhaps with advantage. They have three toes. Theſe animals are found two or three feet long, with a large head and pointed ſnout. The whole body is covered with quadrangular ſcales; and the belly is white mixed with blue. It has four crooked teeth; alſo a very ſharp pointed tail, which, however, inflicts no wound. On the back, two ſtreaks of a lighter colour, bordered on each ſide with a thin blacker ſtreak.

Inhabits Italy, France, &c. It is viviparous; fifteen young ones having been taken alive out of its belly. On the whole, it appears to bear a ſtrong affinity to the viper; and ſome think its bite may be dangerous.

THE CHALCIDE

APPROACHES yet nearer to ſerpents in form than the Seps: longer in body; no opening for the ears; legs very ſhort; its ſcales placed ring-wiſe on its body; each ring ſeparated by a little gutter, as well on the body as the tail; the head reſembles the Seps; three toes to each foot; inhabits hot countries; might have been thought the immediate link that unites the lizard to the ſerpent claſs, had not ſome *biped* reptiles been diſcovered, whoſe peculiar forms are yet more ſerpentine, from that circumſtance.

THE DRAGON.

THE Dragon of imagination is a moſt terrible animal, but not that of nature; like what we have ſeen of the Baſiliſk, fancy has been equally remote from fact as from probability.

The Dragon or Flying Lizard lives on fruit-trees, and feeds on flies, ants, butterflies, and other ſmall inſects. Is a very harmleſs creature, and does no miſchief in any reſpect. Its wings are compoſed of ſix cartilaginous rays, placed horizontally on each ſide the back, and near the fore legs; theſe bend backward, and ſuſtain a membrane, which ſurrounds the firſt ray, and extends to the hind legs; each wing repreſents a triangle, its baſe attached to the back of the creature; this membrane, as alſo the body, is covered with ſcales, hardly perceptible, except under the wings; theſe wings reſemble thoſe of the flying fiſh, or thoſe of flying ſquirrels. About the neck are three bags, which he can inflate at pleaſure; his throat is wide; he has many and ſharp teeth; on the back three rows of tubercles, ranging lengthways; legs long; five toes to each foot; long, ſeparate, and having hooked nails; tail very thin; twice as long as the body, and ſcaly; whole length a foot. When he ſkims from one tree to another, he ſtrikes the air audibly with his wings, and ſometimes leaps thirty feet.

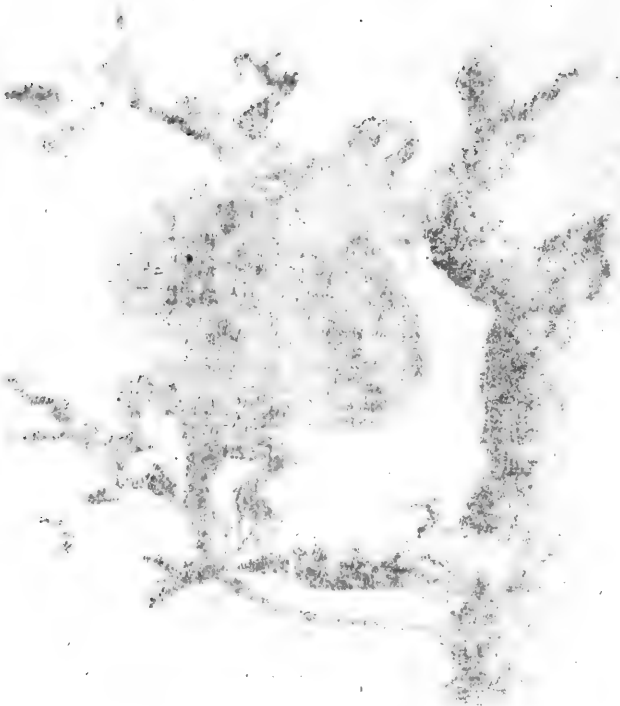
Inhabits Aſia, Africa, and America; has an agreeable mixture of colours, black, brown, and blue, in ſpots or ſtreaks, varying with climate, &c. He ſwims well; his wings and inflated wattles rendering him very buoyant.

THE SALAMANDER.

THE ancients have deſcribed a lizard bred from heat, living in flames, and feeding on fire. Marvellous imagination has here ſurpaſſed itſelf; or certain ill-obſerved circumſtances have been magnified and multiplied, till, the bounds of truth being paſſed, no limits were ſet to roving ſuggeſtion.

The

The Dragon



The terreſtrial Salamander is of the lizard kind. This name comprehends a large tribe. This lizard has been but imperfectly known, becauſe he is rarely ſeen out of his hole: has four toes before, five behind; length ſeven inches or upwards. No ſcales on his ſkin, but a great number of little orifices, which diſcharge a viſcous liquid that ſpreads over the ſkin, and *varniſhes* the whole animal. The head is ſomewhat flat; the eyes on its upper part prominent, as alſo *interiorly* in the palate, where they are ſurrounded by a row of very ſmall teeth, like thoſe of the jaws. Colour deep; blueiſh on the belly; broad yellow ſpots on the body, feet, and eyelids. In the woods of Germany, ſome black above, yellow below. Has no ribs (like frogs). When touched, inſtantly bedews itſelf with the unctuous liquor mentioned, and can as rapidly become dry. This liquor is very acrid. Loves humid and cool ſpots, thick ſhades and woods, or hollow trees: paſſes winter, many together, in holes under ground. Walks very ſlowly on the ground; does not climb trees: is very retired; fears the heat of the ſun, and quits its aſylum only in rainy weather. Lives on flies, beetles, and other inſects. Is often folded on itſelf like ſerpents; can remain ſome time in water, where it quits its ſkin; always endeavours to keep its noſe above water. Has no apparent orifices for the ears; is ſilent. Defends itſelf only by its covering liquid, and ſeems inſenſible of danger. Is viviparous, brings forty to fifty young.

THE FLAT-TAILED SALAMANDER

IS capable of living on land as well as in water; but prefers the latter element for his reſidence. Has no ſenſible ſcales on his body, or nails on his toes; four toes before. Length ſix or ſeven inches. Head flat; tongue broad and ſhort; ſkin hard, and ſheds a kind of milk, when wounded: ſmall whitiſh warts on the body. General colour more or leſs brown, lightening under the belly to a yellow. Is ſpotted, often round, deep-coloured brown in the male; ſometimes blueiſh. The male has a kind of creſt running down his back, membranous, and jagged: the tail has a membrane *vertically*, which makes the tail ſeem flat: the ſame nearly occurs in the female; but ſhe has no creſt on the back.

Loves

Loves gravelly water, where it hides under the ſtones, in ditches, and marſhes, or ponds; rarely in running ſtreams. In winter, retires commonly into ſubterranean humid places; walks very ſlowly on land; ſometimes, when it comes to breathe at the water edge, has a little kind of whiſtle; is very tenacious of life; has been found in the midſt of ice, ſometimes frozen up, and recovered when the ice was thawed, which in ice-houſes has been a long time after its congelation. Eats flies, water-inſects, frog ſpawn, &c. alſo water-beans, which float on the ponds. Is not viviparous; but in April or May lays eggs, often twenty, which form two ſtrings, and are united by viſcous matter, which alſo envelopes them ſingly. When laid, they fall to the bottom of the water; as they enlarge, through the viſcous jelly, and the tranſparent membrane which it incloſes, is ſeen the young ſalamander folded in the liquor which this membrane contains. This embryo enlarges inſenſibly, and quickly moves with great agility: after eight or ten days he tears the membrane, and gains his liberty. In this ſtate he has ſome conformity to fiſhes; while his legs are very ſhort, he has on each ſide, and a little above his fore legs, little fringed tufts, which reſemble fins, or a feather: they are analogous to the gills of fiſh, and perhaps ſerve for the ſame purpoſe, to filtrate the air contained in the water; theſe gradually diminiſh, and diſappear, adhering to the ſkin.

In ſummer the aquatic Salamander quits his ſkin every four or five days; in more temperate weather after a longer interval. A day or two before this change, the animal is more liſtleſs than ordinary, nor regards worms or inſects, his favourite prey. His ſkin is detached from his body in ſeveral places; and its colour fades: he uſes his front feet to looſen and open his ſkin about his jaws, this he puſhes over his head, till his fore legs are free; he continues to puſh this looſened ſkin off from him, as far as his fore-legs can reach; but he is obliged to rub againſt the ſtones, gravel, &c. to further his endeavours. After a while, the front part of the ſkin is turned on his back and tail; when ſeizing it with his mouth, and diſengaging one hind foot after the other, he gets free from his late covering. Thus the old ſkin is turned inſide outwards; but is not torn in any place: the ſpace for the eyes is left void and open. After this operation, which engages an hour and a half, the animal appears in his full vigour, and his new ſkin is ſmooth and brilliant. The caſt ſkin is found floating on ponds, &c. Even in winter, this animal often forms more than one new ſkin; for in temperate winters he is not torpid.

Sometimes

The three-fingered Salamander.

Sometimes the back part of this ſkin adheres too cloſely to yield to the creature's efforts; then it corrupts, and corrupts alſo the leg adjacent, which drops off; but this loſs does not kill the animal. Salt is fatal to ſalamanders. Are not venomous. Inhabit moſt parts of the world.

THE THREE-FINGERED SALAMANDER

IS an inſtance, that, though imagination may have greatly augmented and diſguiſed ſome obſervations and facts of Natural Hiſtory, yet at the bottom may be truth; and could we ſtrip off fallacy, or could we diſtinguiſh addition from fact, many relations, which are now ridiculous and falſe, might be admitted, under certain limitations. That the ſalamander is the creature of fire, is falſe; yet, the only one known of this ſpecies was found on the crater of Veſuvius, ſurrounded by the burning lava of that volcano. What further authority does poetic licence require to regard this lizard as incombuſtible?

This ſalamander has ribs; three toes before, four behind; head flat, rounded in front; tail thin, longer than the body. Colour deep brown, mingled with reddiſh on the head and belly. Nothing of its natural habits known, this being a ſolitary ſpecimen: perhaps as many lizards, &c. are fond of the heat in the torrid zone, this might have ſtrayed to where it was found, without ſuffering a heat greater than many others of its ſpecies elſewhere enjoyed.

OVIPAROUS QUADRUPEDS WITHOUT TAILS.

THE abſence of the tail is in theſe a ſtriking and permanent diſtinction; they are alſo but ſmall in ſize, eight or ten inches being the largeſt. They have no ſcales on their body; their ſkin is full of warts, or tubercles, and bedewed with a viſcous liquid. Moſt have only four toes before; ſome, inſtead of five behind, have ſix, more or

leſs marked; in ſome diſtinct, in others membraned. The hind legs much longer than the front; whence they do not walk, but leap: the *tarſus* almoſt always as long as the legs. They have no ribs, nor vertebræ in the neck, or at moſt one or two; their head being attached immediately to the body, like that of a fiſh. The young appear long under the tadpole form.

They may be divided into three kinds: 1. Thoſe with long bodies and heads, thin bellies, and very long legs. 2. Thoſe whoſe toes have a ſmall viſcous ball, by means of which they fix themſelves even on the under ſurface of the moſt poliſhed bodies. 3. Thoſe with round bodies and heads, very ſhort fore legs, hind legs not long; leap with difficulty; fear the light, and appear only in an evening; their eyes being formed ſimilar to thoſe of owls, &c.

THE FROG.

THE figure of the Frog is well known. Its power of taking large leaps is remarkably great. It is the beſt ſwimmer of all four-footed animals; Nature hath finely adapted its parts for thoſe ends, the arms being light and active, the legs and thighs long, and furniſhed with very ſtrong muſcles: muzzle ends in a point; large eyes, lively, encircled with gold colour; ears behind the eyes, covered with a membrane: noſtrils near the end of the muzzle: large mouth; no teeth; tubercles, and aſperities on the back. Colour, more or leſs bordering on green, in ſome kinds. Four toes before; five behind, theſe membraned. The inner toe in all the feet ſeparated from the others, and largeſt. A viſcous humour ſweats through the pores of its ſkin. Very little brain for its ſize; a very wide ſwallow; a ſtomach ſeemingly ſmall, but capable of great diſtention. The heart has but one ventricle; ſo that the blood circulates without aſſiſtance from the lungs, while under water. The blood moves very ſlowly, and unequally, drop by drop. While young, they open and ſhut their mouth and eyes, every time the heart beats. The lungs reſemble a number of ſmall bladders joined together, like the cells of a honey-comb: are connected to the back by muſcles, and can be diſtended or exhauſted at the animal's pleaſure.

The common Brown Frog couples early, generally about the middle of March. The male is uſually greyiſh brown; the female inclining to yellow, ſpeckled with brown. At this time their colours are nearly alike on the back; but as they change their ſkins almoſt every eighth day (the old one, after falling off, aſſuming the form of mucus), the male grows yellower, and the female browner. In the males the arms and legs are much the ſtrongeſt; at this time they have on their thumbs a kind of fleſhy excreſcence, which they fix firmly to the breaſt of the female. Couple once a year: continue united days together. Their bellies greatly ſwollen; the female with eggs, the male with a limpid water. He throws his fore legs round her breaſt, and claſps his fingers between each other; the thumbs preſſing with their thickeſt ſides againſt her breaſt: nothing can induce him to let go his hold: the graſp ſeems involuntary and convulſive; they ſwim and creep together till the female has ſhed her eggs: theſe form a kind of cord, united by a glutinous matter which covers them: theſe the male impregnates as they are ejected.

A ſingle female produces from ſix to eleven hundred eggs; in general by a ſingle effort, though ſometimes ſhe is an hour in this taſk. While thus engaged, the male promotes their expulſion by working with his thumbs, and compreſſing her body cloſely. The eggs, when excluded, expand into a round form, and drop to the bottom of the water.

The egg, or little globe, black on one ſide, whitiſh on the other, which produces a tadpole, is ſurrounded with two different kinds of liquor, each incloſed in its proper membrane. That which immediately ſurrounds the globe is clear and tranſparent; that which ſurrounds the whole is muddy and mucous. The tranſparent liquor ſerves for nouriſhment to the tadpole from time to time, anſwering the ſame purpoſes as the white of the egg to birds. The tadpoles, when this membrane is broken, are found to adhere to it by their umbilical cord, which is attached to the head.

At the bottom of the water the white quickly and ſenſibly increaſes. After four hours the eggs begin to enlarge; and, growing lighter, mount to the ſurface of the water. After eight hours the white grows thicker, the eggs loſe their blackneſs, and, as they increaſe in ſize, ſomewhat of their ſpherical form. After fifteen days the eyes appear (ſometimes ſhut), and the lineaments of the hind legs. As the fœtus increaſes in ſize, the ſkin lengthens: where the toes will be, is marked by little knobs; and

though no bone is yet formed, the ſhape of the foot is diſcoverable. The front legs remain hidden by the covering ſkin. The mouth of the tadpole is *under* the head; ſo that, like the ſhark, it muſt turn on its back to catch any thing above it: this motion they execute with almoſt imperceptible rapidity. The twenty-firſt day the egg opens a little on one ſide, and the tail peeps out, becoming more and more diſtinct every day. The thirty-ninth day the little animal begins its motion, moving at intervals its tail; and the liquor in which it is circumfuſed perceptibly ſerves it for nouriſhment. In two days more, ſome fall to the bottom; while others remain ſwimming in the fluid around them, increaſing in vivacity and motion. Thoſe at the bottom remain there the whole day; but having lengthened themſelves a little (for hitherto they are doubled up) they mount at intervals to the mucus they had quitted, and are ſeen to feed upon it. The next day they acquire their tadpole form. In three days more they are perceived to have two little fringes, that ſerve as fins, beneath the head; and theſe in four days after aſſume a more perfect form. Now they feed greedily on the pond-weed; and, leaving their former food, continue to ſubſiſt on this till they arrive at maturity. When ninety-two days old, two ſmall feet begin to burgeon near the tail; and the head appears ſeparate from the body. The next day, the legs are conſiderably enlarged; four days after, they refuſe all vegetable food; their mouth appears furniſhed with teeth, and their hinder legs are completely formed. In two days more the arms are completely produced; the ſkin divides on the back near the head, which paſſes through the diviſion: the membrane, which ſerved for a mouth to the tadpole, is drawn backward; the arms are projected; and the enveloping ſkin, perpetually driven backwards, at length quits the body: and now the frog is every way perfect, except that it ſtill continues to carry a tail. In this odd ſituation the animal, reſembling at once both a frog and a lizard, is ſeen frequently riſing to the ſurface to breathe. Thus it continues about ſix or eight hours, till the tail diminiſhing by degrees, the animal appears in its moſt perfect form.

So extraordinary is this transformation, that the food it fed on greedily a few days before, is now rejected; it would even ſtarve if ſupplied with no other: from having fed on vegetables, it becomes carnivorous, and lives entirely on worms and inſects; quitting its native element, theſe it ſeeks on land. At firſt, being feeble, and unable to bear the warmth of the ſun, it hides among buſhes and under ſtones; but if a ſhower refreſh the earth, then multitudes quit their retreats, to enjoy the grateful humidity:

midity: often the ground is ſeen perfectly blackened with their numbers, ſome ſeeking for prey, and ſome for ſecure lurking places. From the myriads that appear on ſuch occaſions, ſome have thought they were generated in the clouds, and ſhowered down on the earth.

The Frog lives moſtly out of water; but, when the cold nights begin, returns to ſtagnant waters, where it can lie concealed at the bottom. Here it continues torpid, or with very little motion, all the winter; but ſome reſide in holes in the earth.

The difference of ſexes is not perceivable in theſe animals till their fourth year, when they begin to propagate. It is ſaid they live about twelve or fifteen years: but probably much more.

Frogs eat inſects of all kinds; alſo young ſnails, young mice, and ducklings; but never, unleſs they have motion. They continue fixed and immovable till their prey appears; when it comes ſufficiently near, they jump up or forward, ſometimes a foot or two, with great agility, dart out their tongues, and ſeize it with certainty. The tongue is extremely long (and this length of tongue is drawn out, like a ſword from its ſcabbard, to aſſail its prey). It is furniſhed with a glutinous ſubſtance; and whatever inſect it touches infallibly adheres, till drawn into the mouth.

The Frog is very vivacious, and can bear hunger long. It will live and jump about ſeveral hours after loſing its head; will continue active, though embowelled: nor does the loſs of its heart imply the loſs of motion.

The croaking of frogs is well known; and from thence, in ſome countries, they are diſtinguiſhed by the ludicrous title of Dutch Nightingales. The large water frogs have a note like the bellowing of a bull, and puff up their cheeks to a ſurpriſing magnitude. The male only croaks; the female rather growls. The male has a leſs diſagreeable voice, as the call to courtſhip. When they couple, their croaking is in ſome places very troubleſome, for the whole lake ſeems vocal, and a thouſand diſſonant notes perfectly ſtun the neighbourhood; alſo, before wet weather, their voices, in full exertion, with unceaſing aſſiduity welcome the approaches of their favourite moiſture. Dry weather is hurtful to their health, and prevents them from getting their prey: they alſo want that grateful humidity which moiſtens their ſkin, and renders them alert and active.

CATESBY thinks that in Carolina the Frogs prefer thoſe inſects that ſhine in the dark; whether as better pleaſing their palate, or as being more

more readily diſcernible, is uncertain. Being out in the air one very hot evening, he chanced to let fall ſome burning tobacco from his pipe, which was inſtantly ſwallowed by a frog; as was a ſmall burning coal of wood, and many other ſhining (though heated) bodies.

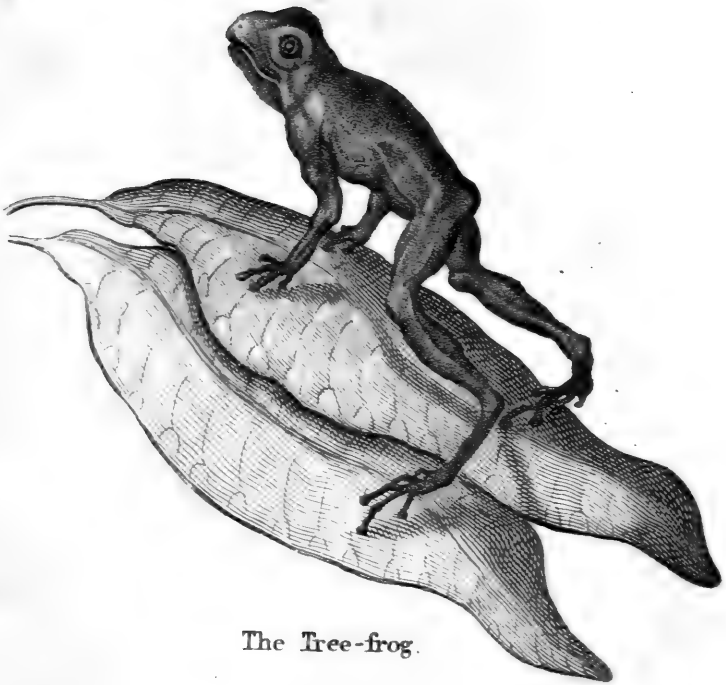
THE BULL FROG

IS very large; has large oval eyes, brilliant and prominent; iris red, bordered with yellow; upper part of his body deep brown, ſpotted deeper, with a tinge of yellowiſh green, particularly on the front of the head: belly dirty yellow, clouded with yellow, and lightly ſpotted. Commonly five toes to each foot, with a tubercle under each joint. Is leſs frequent than moſt other frogs; lives in ſprings, which are often on the ſides of hills in Virginia; commonly two to each ſpring or pond. They ſit at the entry of the hole which furniſhes the water, and when ſurpriſed leap into the water. The Virginians think they purify the water, which perhaps they do, by deſtroying inſects that might otherwiſe pollute it; but they alſo deſtroy young ducklings, if not goſlings; which, having a very wide gullet, they can eaſily do. This conformation, and their ſize, aided by the echoes of the ſurrounding banks and cavities, renders their croaking ſomewhat formidable, and like that of a bull bellowing at a diſtance. A traveller, unuſed to them, is greatly at a loſs to account for the noiſe they make, as they are themſelves inviſible, being entirely under water, except juſt their muzzles, whence iſſues their ſurpriſing croaking. Some have ſix toes on the hind feet.

THE TREE FROGS

FORM a peculiar ſpecies, diſtinguiſhable by a kind of ſmall knob or button at the extremity of each toe. Theſe knobs are unctuous, or viſcid; and by this property the creature can eaſily ſupport itſelf on the branches or leaves of trees.

Whatever



The Tree-frog.

Whatever has been ſaid of the inſtinct or agility of frogs, applies with greater force to the *Green* or *Common Tree Frog*, which, in ſize, is leſs than the frog. Colour, on the upper parts, a beautiful green; beneath, where it has ſmall tubercles, whitiſh. A yellow ſtreak, ſlightly bordered with violet, extends on each ſide the head and back, from the noſe to the hind feet; and another, anſwering it, from the upper jaw to the front feet. The head is ſhort, as large as the body, but a little ſnubbed in front. The jaws are rounded; the eyes elevated. The body is ſhort, almoſt triangular; very broad near the head, convex above, flat beneath. The front feet, which have but four toes, are ſhort and thick; thoſe behind have five toes; are very long and thin. The nails are flat and rounded.

The Green Tree Frog leaps with ſuperior agility to the common Frog, becauſe its hind legs are ſo much longer than the front. It paſſes all the fine weather in the midſt of the woods, or branches of trees: its ſkin is ſo ſticky, and its toes ſo adheſive, that it has but to place itſelf any where on a leaf, above or below, and it fears not falling. CATESBY ſays, they have the faculty of rendering their little knobs *concave*, which occaſioning a vacuity, attaches them more ſtrongly to the ſurface on which they faſten. He ſays alſo that they ſometimes leap twelve feet. In fine weather they are ſeen darting on the inſects that come within their reach; theſe they ſtrike with their tongues like frogs, leaping from branch to branch. Like frogs, they continue long in their tadpole ſtate; nor attain complete maturity till after three or four years, when they couple: till then they are nearly ſilent, even the males. They ſeek each other in the waters as frogs; and, in winter, hide in marſhy places, but always thoſe ſurrounded with trees, as if they ſtill paid attention to what is their favourite reſidence. In April or May they are found in the lakes, and with ſonorous croakings, perpetually repeated, and multiplied by every neighbour's note in addition, like a pack of hounds in full cry, they compoſe a moſt noiſy chorus, which, in the ſilence of night, when rain is expected, may be heard at a league diſtance. The young are often two months before they attain their moſt perfect ſtate; but, ſo ſoon as they are perfect, they forſake the waters for the woods. May be kept in houſes without much trouble. Is found in Europe (the ſouthern parts), in Africa, and America.

One American ſpecies is milk white, with faded ſpots.

That which our plate repreſents is the American kind, uſed by the Indians to colour the feathers of young parrots red or yellow. By

plucking the natural feathers of the parrot, and rubbing the place with the blood of this creature, the following feathers, inſtead of being green, as they otherwiſe would be, are red or yellow. Its colour is reddiſh.

THE TOAD.

ITS colours vary with the ſeaſon; ſometimes inclining to red, then to black, or to olive. Why ſhould the figure of the Toad diſguſt more than that of the Frog? Its form and proportions are not unlike; it chiefly differs in colour, being blacker, and by its ſlow and heavy motion, which exhibits nothing of the agility of the frog. Its body is rounded and broad; its back covered with a duſky, pimpled hide; its belly large and ſwagging; its pace laboured and crawling; its retreat gloomy and filthy; and by theſe ideas its appearance excites diſguſt. Its pimples are often greeniſh black. The auditory canal is cloſed by a membrane. Its front feet are ſhort, and have four toes; thoſe behind have ſix toes, united by a membrane. Its head is as large as its body, its jaws have no teeth; its eyes are ſwelled; its motion, when ſeized, is a *ſwelling*; it leaps badly; it ejects a liquor (thought to be its urine) when ſeized; and this, in ſome kinds and climates, has the repute of being venomous, or at leaſt hurtful. The humour which ſweats from its body, and its ſlaver, have the ſame character; but much ſeems to have been ſaid beyond what our European Toads verify.

Lives in ditches, drains, dunghills, and caverns, in foreſts, and beneath great ſtones; here remaining all day hidden, unleſs a ſhower call it out. Prefers night to ſeek its prey. Is amphibious; lives on worms and inſects, ſnails and beetles, which it ſeizes by darting out its length of tongue; crawls in moiſt weather; couple as frogs, early in ſpring, ſometimes on land, but uſually in the water; are united ſome hours. The obſtetrical aſſiſtance which the male lends the female, is a peculiarity in this ſpecies. In a ſummer's evening, a French gentleman perceived, in the king's gardens at Paris, two toads coupled. Two facts equally new ſurpriſed him: the firſt was the extreme difficulty the female had in laying her eggs; the ſecond was the aſſiſtance lent her by the male for this purpoſe. The eggs of the female lie in her body, like beads on a ſtring; after the firſt, by great effort, was excluded, the male caught it with his

hinder paws, and kept working it till he had extracted the whole chain, which is often forty feet long, impregnating every egg as it iſſued from the body. It is probable this difficulty occurs only on land. The number of males is found to ſurpaſs that of the other ſex thirty to one.

The account given of the progreſs of the frog in and after its tadpole ſtate, is deſcriptive of the ſame events in the life of a toad, and need not be repeated. When they have undergone all the variations of that ſtate, they forſake the water, and are often ſeen, in a moiſt ſummer's evening, crawling up, by myriads, from fenny places into drier ſituations. There, having found out a retreat, or having dug themſelves one with their mouth and hands, they lead a patient, ſolitary life, ſeldom venturing out, except when the moiſture of a ſummer's evening invites them abroad. We have the authority of Linnæus for ſaying, that they ſometimes continue immoveable, with the mouth open, at the bottom of ſhrubs, where butterflies, in ſome meaſure faſcinated, are ſeen to fly down their throats.

In a letter from Mr. Arſcott are ſome curious particulars relating to this animal. "I knew it myſelf above thirty-ſix years; and by conſtantly feeding it, brought it to be ſo tame, that it always came to the candle and looked up, as if expecting to be taken up and brought upon the table, where I always fed it with inſects of all ſorts. It was fondeſt of fleſh maggots, which I kept in bran; it would follow them, and when within a proper diſtance, would fix his eyes, and remain motionleſs for near a quarter of a minute, as if preparing for the ſtroke, which was an inſtantaneous throwing its tongue at a great diſtance upon the inſect, which ſtuck to the tip by a glutinous matter. The motion is quicker than the eye can follow. I cannot ſay how long my father had been acquainted with the toad before I knew it; but when I was firſt acquainted with it, he uſed to mention it as the old toad I have known ſo many years. This old toad made its appearance as ſoon as the warm weather came. Spiders, millepedes, and fleſh maggots, ſeem to be this animal's favourite food. In the heat of the day they will come to the mouth of their hole, I believe for air. I once, from my parlour window, obſerved a large toad I had in the bank of a bowling-green, about twelve at noon, a very hot day, very buſy and active upon the graſs. So uncommon an appearance made me go out to ſee what it was; when I found an innumerable ſwarm of winged ants had dropped round his hole; which temptation was as irreſiſtible as a turtle would be to a luxurious alderman. A tame raven one day ſeeing it at the mouth of its hole, pulled it out, and, although I reſcued it, pulled out one eye, and hurt it ſo, that notwithſtanding its living a

twelvemonth, it never enjoyed itſelf, and had a difficulty of taking its food, miſſing the mark for want of its eye."

The Toad is torpid in winter; often many in the ſame hole; and retreats to the hollow root of a tree, the cleft of a rock, or the bottom of a pond, where it is in a ſtate of ſeeming inſenſibility. As it is very long-lived, it is very difficult to be killed; its ſkin is tough, and cannot be eaſily pierced; and, though covered with wounds, the animal continues to ſhew ſigns of life. But what ſhall we ſay to its living lodged in the boſom of ſtone, or caſed within the body of an oak? BACON aſſerts that Toads have been ſo found: Dr. PLOTT aſſerts the ſame. There is to this day a marble chimney-piece at Chatſworth, with the print of the toad upon it, and a tradition of the manner in which it was found. In the Memoirs of the Academy of Sciences there is an account of a toad found alive and healthy in the heart of a very thick elm. In the year 1731 there was another found near Nantz, in the heart of an old oak without the ſmalleſt iſſue to its cell, and the diſcoverer was of opinion, from the ſize of the tree, that the animal could not have been confined there leſs than eighty or a hundred years. To theſe we can only oppoſe the ſtrangeneſs of the facts; the neceſſity this animal appears under of receiving air; and its dying like all others in the air-pump, when deprived of this all-ſuſtaining fluid. Certain it is that, if kept in a damp place, the toad will live for eighteen months without any food whatſoever; and though kept in boxes ſealed carefully with wax. It is probable that thoſe in trees were not abſolutely without air; ſince ſome might be tranſmitted by the pores or air veſſels of the wood. That ſome, thus found, were rather preſerved from putrefaction, than really living, ſeems alſo ſuppoſable; and if ſo, there being no evaporation through ſtone, they might have retained their moiſture many centuries, and yet have furniſhed ſomewhat thought to be blood.

Of this animal there are ſeveral varieties; ſuch as the Water and the Land Toad, which probably differ only in the ground colour of their ſkin. In the firſt, it is more inclining to aſh-colour, with brown ſpots; in the other, the colour is brown, approaching to black. The water toad is not ſo large as the other; but both equally breed in that element. The ſize of the toad with us is generally from two to four inches long; but, in the fenny countries of Europe, much larger. But this is nothing to their ſize in ſome of the tropical climates, where travellers often, at the firſt time, miſtake a toad for a tortoiſe. Their uſual ſize is from ſix to ſeven inches, and ſome larger. In Carthagena and Porto-bello their bite

bite is ſaid to be very dangerous. All theſe are found in the tropical climates in great abundance, and particularly after a ſhower of rain; then the ſtreets, courts, and gardens ſeem entirely covered with them; they then crawl from their retreats, and go into all places to enjoy their favourite moiſture. With us, the opinion of its raining toads and frogs is juſtly exploded; is ſtill entertained in the tropical countries, and that not by the natives only.

The BROWN TOAD is ſmooth-ſkinned, having no warts, but large brown ſpots which touch each other; largeſt on the back. The crevice for the eyes, when contracted, is vertical, inſtead of horizontal. Is found in marſhes: when enraged, exhales a fœtid ſmell, ſomewhat like gunpowder, ſtrong enough to cauſe weeping. Some have thought it mortally venomous; this is too much; but that it may be hurtful ſeems likely.

The CALAMITE has two falſe nails on the ſoles of his feet, which, with a horny ſubſtance at the extremity of his toes, enable him to clamber up walls, &c. ſeveral feet.

The FIRE-COLOURED TOAD carries his agility yet farther; can bear day-light, and his eye then takes a triangular form, whoſe outline is golden. Croaks without ſwelling his throat. Seems to form a link between the frog and the toad kinds.

The PIPAL or SURINAM TOAD. The male and female are ſo different, that they may eaſily be miſtaken for two diſtinct ſpecies. The male has four toes, ſeparate, on the front feet; and five, membraned, on the hind feet. Each toe on the front foot is divided into four ſmall parts at its extremity. The head is ſcarce diſtinguiſhable from the body; the opening of the gullet very large; the eyes very ſmall, and diſtant from each other, placed on the upper part of the head; head and body very flat. General colour olive, more or leſs clear, and ſprinkled with very minute ſpecks, red or reddiſh.

The female is much larger than the male; her head is triangular; at its baſe much larger than the anterior part of the body. The body is commonly full throughout of very ſmall warts; is five or ſix inches long; in other reſpects agrees with the male.

It was once thought that the eggs, when formed in the ovary, were ſent, by ſome internal canals, to lie and come to maturity under the bony ſubſtance of the back, and, in this ſtate, were impregnated by the male, the ſkin continuing ſtill apparently entire, forming a very thick covering over the whole brood; but the fact is, that after the eggs are impregnated

impregnated in the uſual way, the male gathers them up, and places them on the back of the female, where they adhere: the ſkin of her back ſwells and forms around them little cells, where they are hatched. At firſt, they have a tail like tadpoles, which ſoon quits them.

The HORNED TOAD is frightful; his head half the ſize of his body; his jaws open enormouſly; his eye-lids have the form of a pointed cone, which makes them ſeem armed with horns, wherein are his eyes. His feet have ſomething the air of hands.

BIPED REPTILES.

WE have ſeen that the Seps and the Chalcide approach very nearly in form to the order of Serpents, by their length of body, and by their extreme ſhortneſs of feet. The preſent claſs of reptiles is yet more ſerpentiform, and unites more cloſely the Lizard kind to the Serpent. They follow, with propriety, the Oviparous Quadrupeds, as in many reſpects allied, yet differing, by having two feet only; and they precede the Serpents, as feet are entirely wanting to thoſe creatures: in other reſpects they might eaſily be confounded with them, by their length of body, proportion of the head, and form of the ſcales.

On this claſs of creatures little has hitherto been determinate and authentic: that many imperfect quadrupeds of the ſeps, &c. kinds, have been ſuppoſed bipeds is certain; on the other hand, the immature ſtate of ſome ſalamanders, and others, reſembles that of the ſeveral ſuppoſed bipeds; but whether there be any creature which in its *larvæ* ſtate equals thirty-one inches in ſize, as ſome of theſe have been found, remains in obſcurity.

THE FLUTED

WAS found in Mexico by M. VELASQUEZ; has no hind feet; is clothed with ſcales, diſpoſed in rings; has a very ſhort tail. Its ſcales are almoſt ſquare, ranged in half rings on the back, and alſo on the belly, correſponding to each other where they meet; and here is a kind of fluting, or groove, running down the animal on each ſide. The tail has its ſcaly rings entirely round. Total length of this individual nine inches. The head of this creature is rounded; the upper part covered with

with one great ſcale; the muzzle has three ſcales; the two exterior perforated, for the noſtrils. Teeth very minute; eyes ſcarce viſible; no eye-lids. The feet covered with little ſcales in rings; four toes to each foot, with nails long and hooked. This remarkable creature's manners are unknown: probably they reſemble thoſe of the Seps, and the Chalcide.

THE SHELTOPUSICK

WAS firſt diſcovered by Dr. PALLAS: is found near the Volga, in the ſandy deſerts of Naryn, and near the Cuman. Prefers long graſs, and ſhady vegetation: hides among ſhrubs, and flies when approached. Preys on ſmall lizards. His head thicker than his body; ſnout rounded; ſmall teeth; large noſtrils: two moveable eye-lids; and openings for the ears, like lizards. On each ſide the body a kind of groove; at the ends of theſe grooves, near the vent, two very ſmall feet, covered with four ſcales, dividing into two kinds of toes, ſharpiſh. The tail much longer than the body. Total length exceeding three feet. Colour nearly uniform, pale yellow.

OF SERPENTS.

THERE is ſcarce a country in the world that does not maintain ſome of this poiſonous brood; for though mankind have driven off the lion, the tiger, and the wolf, the ſnake and the viper defy their power, and frequently puniſh their temerity. In Europe, however, not only their numbers are thinned, but their powers are diminiſhed: if we have not extirpated them, we have prevented their multiplication; and the temperature of our climate refuſes to furniſh the qualities neceſſary highly to exalt their venom. The malignity aſcribed to European ſerpents of old, is now unknown. A burning pain in the part, removeable by timely applications, is the worſt effect now generally experienced from their bite. In the ardent countries of the tropic, thoſe regions of both hemiſpheres where the fields are unpeopled and fertile, where the climate ſupplies warmth and humidity, where the ſun is hot, the foreſts thick, and men few, there ſerpents cling among the branches of the trees in infinite numbers, encompaſſing them like a wreath, and riſing and deſcending at pleaſure. Many are common to both continents: eſpecially the largeſt kinds. In thoſe burning countries, what had the appearance of a great river in the rainy ſeaſon, becomes in ſummer one dreary bed of ſand; here a lake that is conſtant, or a brook that is perennial, is to all animals the greateſt enjoyment; parched by the heat, they traverſe whole deſerts to find out water, nor can danger deter them from attempting to ſlake their thirſt. On its banks thouſands of animals attend to drink or to prey. The lion and tiger, but chiefly the larger ſerpents, are upon the watch. Not an hour paſſes without ſome dreadful combat; but the ſerpent, defended by its ſcales, and naturally capable of ſuſtaining a multitude of wounds, and even of renovating its tail, is of all others the moſt formidable; it is the moſt alert, eſpecially before a ſtorm; it is the moſt wakeful alſo; for the whole tribe ſleep with their eyes open.

It is probable, in early times, that ſerpents, continuing undiſturbed poſſeſſors of the foreſt, grew to amazing magnitudes; and might reign the tyrants of a diſtrict for centuries. Time and rapacity might lengthen them to an hundred or an hundred and fifty feet. It is poſſible too they might ſometimes venture from their retreats, and carry conſternation among mankind, as they had before ſpread deſolation among the lower ranks

anks of nature. We are told that, while Regulus led his army along ne banks of the river Bagrada in Africa, an enormous ſerpent diſputed is paſſage over. We are aſſured by Pliny, who ſays that he himſelf aw the ſkin, that it was an hundred and twenty feet long, and that it had eſtroyed many of the army. At laſt, however, the battering engines vere brought out againſt it, and by theſe it was ſoon deſtroyed. Its poils were carried to Rome, and the general was decreed an ovation or his ſucceſs. The ſkin was kept ſeveral years in the Capitol.

Serpents even now are the longeſt of animals, exceeding even crocoliles, and yielding only to whales, &c. They are alſo the ſmalleſt, nany being but two or three inches long, and the ſize of a quill. Thoſe of the large kinds are rare, and diſtant from each other; thoſe of the niddle ſizes often are heaped on each other in ſubterranean retreats.

Serpents, in general, are evidently diſtinguiſhed from the reſt of animated nature. They have the length and the ſuppleneſs of the eel, but no ins; they have the ſcaly covering and pointed tail of the lizard, but no egs; they have the crawling motion of the worm, but alſo lungs to oreathe with: upon the whole, their external ſhape is the ſimpleſt among animals poſſeſſing blood.

The colours of ſerpents are extremely various and brilliant, eſpecially in ſun-ſhine; from the moſt lively white and red, to the deepeſt black. Some ſhew one ſhade only; others exhibit manycolours—contraſted, interwoven in meſhes, diſtributed in lines, prolonged in ſtreaks, diſpoſed in bands, ſpread in ſpots, or ſcattered in ſtars; ſometimes in regular forms, ſometimes in irregular: an infinite diſſimilarity.

Their head is generally protected throughout by a bony helmet: but the back of the ſkull is rather ſhort, by which formation the origin of the ſpinal marrow is expoſed; and here they are eaſily and mortally vulnerable. All ſerpents have very wide mouths in proportion to the ſize of the head, and can ſwallow the head of another animal three times as big as their own. Their jaws do not open as ours, one way only, but are held together at the roots by a ſtretching muſcular ſkin; by which they open widely, like ſtretching leather, extending to admit the morſel, which the ſtomach receives in part, while the reſt remains in the gullet till diſſolved; often part remains in the mouth, and fills it, their windpipe being placed ſo as to ſuffer no injury.

Their hearing is probably dull: the ſonorous rays paſſing through a covering of ſcales to the auditory proceſſes. Their ſmell is alſo thought to be feeble; as their noſtrils are but ſmall, and ſurrounded with ſcales.

The eyes of ſerpents are ſmall, compared to their length of body; differently coloured in different kinds; yet in all malign, brilliant, and lively; very mobile and projecting, and ſo placed as to receive images from the greateſt ſpace their poſition admits. Their ſight, therefore, may juſtly be eſteemed ſharp and piercing. In ſome, the upper eye-lid is wanting, and the ſerpent winks only with that below; in others, the animal has a nictitating membrane, reſembling that of birds, which keeps the eye clean, and preſerves the ſight. The ſubſtance of the eye in all is hard and horny; the cryſtalline humour occupying great part of the globe.

The tongue is thin, long, and forky; compoſed of two long fleſhy ſubſtances, which terminate in points, and are very pliable. At the root it is connected very ſtrongly to the neck by two tendons, that give it a variety of play. Some of the viper kind have tongues a fifth part of the length of their bodies, which are continually darting out; but their poiſon is not in theſe.

The gullet is wide, capable of being diſtended greatly; at the bottom of this lies the ſtomach, which is not equally capacious.

Serpents are furniſhed with very large lungs, in ſome extending three quarters of their bodies: theſe they fill with air at once, but let it ſlowly eſcape.

The heart, as in the tortoiſe, frog, and lizard, has but one ventricle; and the communication between the blood which comes to, and that which quits the heart, is independent of the lungs and of breathing. Hence they are amphibious; but though all are amphibious, ſome love the water more than others, and probably the largeſt kinds. Their blood flows extremely ſlowly, poſſeſſes little warmth; and hence they are in certain degrees of temperature torpid. Theſe are the leſſer kinds; the larger inhabiting climates where no ſuch temperature is known. They awake early in ſpring, and, what is remarkable (as of all ſleeping animals), when the air is not equally warm as when they forſook it in autumn.

The vent in theſe animals ſerves for the emiſſion of the urine and the fæces, and they contain the neceſſary parts for perpetuating the ſpecies. Theſe are double; but there are no external marks whereby to diſtinguiſh the ſexes.

The body of ſerpents is long, ſlender, and capable of bending in all directions, and even folds ſeveral times on itſelf: the joints in the backbone are numerous; in ſome amounting to an hundred and forty-five from the head to the vent, and twenty-five more from that to the tail.

Theſe bones play one within another, like ball and ſocket, ſo that they have complete motion upon each other in every direction. From the head to the vent are two ribs to every joint, uſually longeſt in the middle of the body, and capable of motion in various directions: towards the end of the tail theſe ribs ceaſe. They are furniſhed with muſcles, four in number, which being inſerted into the head, run along to the end of the tail. The vertebræ and ribs compoſe the whole ſolid parts of ſerpents; ſo that their internal parts are defended below only by the ſcales on which they move, and by a kind of fatty matter, which lines the ſkin of their belly, often in conſiderable quantities. This fat alſo contributes to their warmth.

Some time after the animal awakes in ſpring, he acquires a new ſkin, and hides till it be hardened.

Almoſt all their ſcales, but particularly thoſe under the belly, which contribute to motion, are moveable, independent of each other, by a muſcle which belongs to each. As the edge of the foremoſt lies over the end of the following, when the ſcale is erected, it catches in the ground, and furniſhes a point of reſiſtance to promote the animal's progreſſive motion. It is evident that theſe ſcales, lying all one way, impede, or at leaſt do not aſſiſt, motion the other way; and very few ſerpents move equally well backward as forward, though ſome do. In ſome of the ſerpent kind there is the exacteſt ſymmetry in theſe ſcales; in others they are diſpoſed more irregularly. In ſome there are larger ſcales on the belly, and often anſwering to the number of ribs; in others, the animal is without them. But ſerpents have another more powerful principle of motion, by bending into an arch more or leſs of their body; the two extremes of this arch being drawn together, one of them ſerves for a point of reſiſtance to the other, when the arch is ſtraightened. At each repetition of this action, they may be ſaid to make a leap of ſuch a diſtance; and this is proportionate to the ſize, &c. of the creature. During this motion they carry their heads as high as they can. In comparing this to vermicular motion, we obſerve, that the earth-worm has no backbone; but its body is compoſed of rings, which it can lengthen or ſhorten as neceſſary: therefore, to move forward, it lengthens the body, and by the fore part clings to the point it has reached; then contracts, and brings up its rear; then, the body being ſhortened, the fore part is lengthened again for another progreſſion, and ſo on: while the ſerpent, inſtead of ſhortening the body, bends it into an arch; and this is the principal difference between ſerpentine and vermicular progreſſion.

When

When certain ſerpents propoſe to dart ſuddenly on their prey, they roll themſelves into a ſpiral, raiſing only their head; and ſpringing at once, uniting the elaſticity of each part into one whole, they bound with the rapidity of a dart. The motions of ſerpents, when climbing trees, proceeds on the ſame principles as on the ground; but ſometimes they hang by the tail, and ſwinging themſelves backward and forward, at length reach the bough they aſpire to. There are many ſerpents that dart with ſuch amazing ſwiftneſs, they appear rather to leap than crawl; and we are told by ſome that they will dart to a very great diſtance. The manner of progreſſion in the ſwifteſt ſerpent we know (the Jaculus), is by inſtantly coiling itſelf upon its tail, and darting from thence to its full extent; then carrying the tail as quick as lightning to the head, coiling and darting again; and by this means proceeding, with extreme rapidity, without ever quitting the ground. CARLI deſcribes the Long Serpent of Congo, making its track through the tall graſs, like mowers in a ſummer's day. He could not without terror behold whole lines of graſs lying levelled under the ſweep of its tail. In this manner it moved forward with great rapidity, till it found a proper ſituation frequented by its prey.

Among ſerpents ſome are ſilent; but hiſſing is their common ſound, either as a call to their kind, or as a threat to their enemies. In the countries where they abound, they are generally ſilent in the middle of the day, when they are obliged to retire from the heat of the climate; but as evening approaches, they are then heard iſſuing from their cells, with continued hiſſings. Their hiſſing is generally the prelude to their combats; never is the language of pleaſure or of love, but always beſpeaks anger and fury, or pain and vexation; is never heard from far, as it would betray their retreats or approaches. The ſerpent preys indiſcriminately; the buffalo, the tiger, the gazelle, the ſtag, the porcupine, birds alſo, of which it generally ejects the feathers; nay, they frequently are ſeen to devour each other; yet they are capable of protracted hunger, and ſuffer little by it. Vipers are often kept in boxes ſix or eight months without food: and ſome aſſert, certain ſerpents may be kept years. In a letter by ANDREW CLEYERUS, printed in the German Ephemerides, we have an account of a combat between an enormous ſerpent and a buffalo, by a perſon who aſſures us that he was himſelf a ſpectator. The ſerpent had for ſome time been waiting near the brink of a pool, in expectation of its prey; when a buffalo was the firſt that offered. Having darted upon the affrighted animal, it inſtantly began to wrap it round with

with its voluminous twiſtings; and at every twiſt the bones of the buffalo were heard to crack. It was in vain that the poor animal ſtruggled and bellowed; its enormous enemy entwined it too cloſely to get free; till at length, all its bones being maſhed to pieces, and the whole body reduced to one uniform maſs, the ſerpent untwined its folds, to ſwallow its prey at leiſure. To prepare for this, and in order to make the body ſlip down the throat more glibly, it was ſeen to lick the whole body over, and thus cover it with its mucus. It then began to ſwallow it at that end that offered leaſt reſiſtance; while its length of body was dilated to receive its prey, and thus took in at once a morſel that was three times its own thickneſs. Similar accounts have confirmed this. Whenever they ſeize and ſwallow their prey, they ſeem, like ſurfeited gluttons, unwieldy, ſtupid, helpleſs, and ſleepy; they ſeek ſome retreat, where they may lurk for ſeveral days together, and digeſt their meal in ſafety: the ſmalleſt effort at that time is capable of deſtroying them; they can ſcarce make any reſiſtance, and are equally unqualified for flight or oppoſition: this is the happy opportunity of attacking them with ſucceſs.

Serpents have a moſt horrible fœtor: this proceeds from the putrefaction of their food, which corrupts ere their ſtomach digeſts it. Some perſons who have opened ſerpents have been almoſt ſuffocated with the ſtench. To this alſo contribute two glands near the vent, like thoſe in the weaſel or polecat; and, like thoſe animals, in proportion as they are excited by rage or by fear, the ſcent grows ſtronger. The rattleſnake and viper have no ſmell whatever; nay, we are told that at Calecut and Cranganon, in the Eaſt Indies, there are ſome very noxious ſerpents whoſe excrements are ſought after, and kept as the moſt pleaſing perfume. The Eſculapian ſerpent is alſo of this number.

All ſerpents come from an egg; but in ſome the egg burſts in the womb, being come to maturity: and theſe bring forth their young alive, as the viper: while others bring forth eggs, which are afterwards hatched by the heat of their ſituation; as the common Black Snake, and the majority of the ſerpent tribe. The number of their eggs is uncertain, as is the time of their coming to maturity. The eggs are not always laid at once, but one by one, at intervals; and often, it is thought, with pain. If either kind is opened, the eggs will be found in the womb, covered with their membranous ſhell, and adhering to each other like large beads on a ſtring. In the eggs of both, the young ones will be found, though at different ſtages of maturity: thoſe of the viper will crawl and bite in the moment the ſhell that incloſes them is broke open; thoſe of

the ſnake are not yet perfect. After they have acquired life, they receive no leſſons or cares from their parent, but are left ſolely to inſtinct; and perhaps a ſmall proportion reaches maturity. Their length of life is unknown, but probably very long. Father Labat took a viper nine feet long, and ordered it to be opened. In this creature were ſix eggs, each equal to a gooſe egg, but longer, more pointed, and covered with a membranous ſkin, by which alſo they were united to each other. Each egg contained from thirteen to fifteen young ones, about ſix inches long, and as thick as a gooſe quill. Though the female from whence they were taken was ſpotted, the young ſeemed to have a variety of colours very different from the parent; and this led the traveller to ſuppoſe that the colour was no characteriſtic mark among ſerpents. Theſe animals were no ſooner let looſe from the ſhell, than they crept about, and put themſelves into a threatening poſture, coiling themſelves up, and biting the ſtick with which he was deſtroying them. In this manner he killed ſeventy-four young ones. Thoſe that were contained in one of the eggs eſcaped at the place where the female was killed, by the burſting of the egg, and their getting among the buſhes.

Though the generality of mankind regard this formidable race with horror, yet there have been countries, and there are ſome at this day, that conſider them with veneration. Their worſhip by the ancient Egyptians is well known; and many of the nations along the weſtern coaſt of Africa retain the ſame unaccountable veneration. On the gold and ſlave coaſts, a ſtranger, on entering the cottages of the natives, is ſurpriſed to ſee the roof ſwarming with ſerpents, that cling there, unmoleſting and unmoleſted by the natives. But his ſurprize increaſes, farther ſouthward in the kingdom of Widah, when he finds that a ſerpent is the god of the country, has its habitation, its temple, and its prieſts: and numbers are daily ſeen to offer not only their prayers, their goods, and their proviſions, at the ſhrine of their hideous deity, but alſo their wives and daughters.

Serpents may be diſtinguiſhed not only by their colours, but by the number, form, ſize, and arrangement of their ſcales.

I. The Adders, which have a ſingle row of great ſcales under the belly, and two rows of leſſer under the tail. This claſs includes the viper, the aſpic, and adders of various marks.

II. Thoſe which have a ſingle row of great ſcales under the belly, and alſo under the tail. This ſpecies includes the largeſt kinds.

III. Thoſe

III. Thoſe which have large ſcales under the belly and tail, but their extremity is terminated by a moveable and articulated *rattle*.

IV. Thoſe whoſe ſcales under the belly and tail are like thoſe of the back.

V. Thoſe encircled by ſcaly rings, uſually called *amphiſbena*.

VI. Thoſe whoſe ſides have folds, not ribs, named *cæcilia*.

VII. Thoſe whoſe body, next the head, ſhews great ſcales; then the body ſhews ſcaly rings: the tail alſo ſhews theſe rings at its origin, and ſimple ſcales at its extremity.

VIII. Thoſe whoſe ſkin is replete with little tubercles.

In theſe ſhould be formed a diviſion of thoſe *viviparous*, properly called vipers; and thoſe *oviparous*. This diſtinction is not eaſy to aſcertain: but it is ſuggeſted that all vipers are venomous; conſequently may be diſtinguiſhed by their fangs, which are always diſtinct from their teeth. It has been ſuggeſted, alſo, that thoſe which had fangs were generally, yet with exceptions, on the ſummit of the head covered with ſmall ſcales, nearly like thoſe of the back: all others having in that part larger ſcales, of a very different form, always nine in number, and placed in three rows; the firſt and ſecond (counting from the noſe) compoſed of two ſcales, the third of three, and the fourth of two. Not only the colours of ſerpents vary, between the young and the old; but alſo the number of ſcales on their bodies, the oldeſt having the moſt. It is vain to attempt their arrangement by colours, as ſometimes young of ſeveral different colours ſhall iſſue from one parent.

OF VENOMOUS SERPENTS IN GENERAL.

THE poiſon of ſerpents has ever been one of the greateſt objects of human conſideration. The glands that ſerve to fabricate this venomous fluid, are ſituated on each ſide the head, behind the eyes, and have canals leading from thence to the bottom of the fangs in the upper jaw, where they empty into a kind of bladder, from whence grow the fangs on each ſide.

When the ſerpent is irritated to give a venomous wound, it opens its formidable jaws to their wideſt extent: the moveable bones of the upper jaw ſlide forward; the fangs, that lay before inclining, are thus erected; they are ſtruck with force into the fleſh of the object bitten; by meeting reſiſtance

reſiſtance at the points, they preſs upon the bladders of venom from whence they grow; the venom iſſues up through the hollow of the tooth, and is preſſed out through its ſlit into the wound which by this time the tooth has made in the ſkin. Thus, from a ſlight puncture, and the infuſion of a drop of venom ſcarce larger than the head of a pin, the part is quickly inflamed; and, without a proper antidote, the whole frame contaminated.

If a *viper* inflict the wound, it cauſes an acute pain in the place affected, attended with a ſwelling, firſt red, afterwards livid. This, by degrees, ſpreads to the neighbouring parts; great faintneſs, and a quick though low and interrupted pulſe, enſues; great ſickneſs at the ſtomach, bilious and convulſive vomitings, cold ſweats, pains about the navel, and death. Theſe ſymptoms are much more violent, and more rapid, after the bite of a *rattle-ſnake*; but when the perſon is bit by the *cobra di capello*, or *naja*, he dies in an hour, his whole frame diſſolving into a putrid maſs of corruption.

A ſerpent, having once bitten, exhauſts for that time the greateſt part of its poiſon; and, though the wound cauſed by its biting a ſecond time is attended with malignant ſymptoms, yet they are much milder than before. A ſerpent biting upon a ſponge, or a piece of ſoft bread, and then biting immediately after, inflicts a wound not much more dangerous than the prick of a needle. A needle dipped in the venom produces as painful effects as the tooth of the animal itſelf.

As none of this malignant tribe grow to a great ſize, they ſeldom ſeek the combat with larger animals, or offend others till they are firſt offended. They lurk in the clefts of rocks, or among ſtony places; they twine round the branches of trees, or ſun themſelves in the long graſs at the bottom; only ſeeking repoſe and ſafety. If ſome unwary traveller invades their retreats, their firſt effort is to fly; but when purſued, or accidentally trod upon, they then make a fierce and fatal reſiſtance. They raiſe themſelves according to their ſtrength upon their tail, erect their head, ſeize the limb that preſſes them; the wound is given, and the head withdrawn in a moment. The viper is the only animal in Great Britain from whoſe bite we have any thing to fear.

THE

THE VIPER

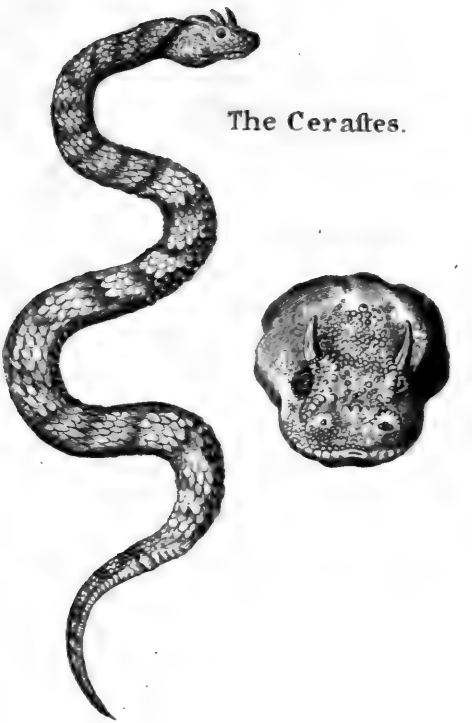
IS the beſt known among this noxious tribe, and is moſt frequent throughout Europe; infeſting our woods, and often our dwellings. Apparently ſmall, feeble, and innocent, but really dangerous. Without elegance of proportion, or colours: commonly two feet long; tail three or four inches: colour, aſh-grey: from his head, down his back, to his tail, a kind of chain of black ſpots, *zigzag*; on each ſide, a range of leſſer ſpots, of which each correſponds to the angle of the *zigzag*. The belly is ſteel-colour; the head narrows near the noſe; the ſcales on the jaws large: number of teeth often eighteen in the upper jaw, twenty-four in the under. On each ſide, in the upper jaw, one, two, three, or four fangs, white, tranſparent, hooked, and very ſharp; one third or more of an inch long: theſe are capable of conſiderable motion, and may be erected or declined at the pleaſure of the animal: commonly they are laid down along the jaw, and then their points are not ſeen; but, to bite, they are erected. Near their baſe, and connected to their roots, are ſeveral reſembling them, but ſmaller, and ſeemingly deſigned to replace them if torn away. Theſe fangs are hollow, having two cavities, one on the convex, the other on the concave part of the fang: the firſt of theſe opens on the baſe of the tooth, and at its point; the ſecond at the baſe, where it receives veſſels and nerves: theſe fangs are alſo incloſed in a kind of covering during two thirds of their length. The poiſon of the viper is contained in a bag placed on each ſide the head, below the muſcle of the upper jaw; which muſcle, when in action, preſſes this bag, and ſqueezes out the venom, which, paſſing through the cavities in the fangs, reaches the points, and penetrates into the wound. No other venom is in the viper, though ſome have thought its ſlaver to be noxious. This poiſonous juice is yellow: neither alkali, acid, nor cauſtic: when dry, ſplits and divides, to a reſemblance of a ſpider's web: has no effect on animals void of blood, nor on vipers themſelves: in warm-blooded animals, its effects are quickeſt in the ſmaller ſpecies, and in proportion to the quantity injected into the wound, probably alſo according to the heat of the ſeaſon, climate, &c. Is dangerous taken internally in ſufficient quantity. It acts probably by acrimonious coagulation of ſome kind; ſpreads by mingling with the blood: if wounds do not penetrate to the blood, they are ſafe. The fright attending wounds is often a cauſe of danger.

The

The eyes of the viper are lively; have eye-laſhes: when irritated it opens its jaws, projects its tongue (which is ſplit two thirds of its length), and ſhakes it with great vivacity; this member is enveloped in a kind of ſheath. The jaws of this creature may not only be widely ſeparated from each other, but alſo the two ſides of each jaw are capable of motion independent of each other: this contributes to the eaſier ſwallowing of his prey, which, while tightly held by the teeth on one ſide, is drawn by thoſe of the other ſide. Feeds on inſects, ſcorpions, lizards, frogs, toads, rats, moles, &c. Suſtains hunger long; when captive, will kill, but not eat, even mice, its favourite prey. In cold weather many aſſemble for mutual warmth. Are often taken clothed with a double ſkin, the old and the new one; change in ſpring: come to full growth in ſix or ſeven years, but in two or three are capable of reproduction: couple in May; female goes three or four months; ſometimes produces twice a year. The eggs in the viper are the ſize of blackbirds eggs; in two parcels; in number, from one dozen to two: the young ones are rolled round in the egg before their birth. The ſpecies is greatly ſpread, from India to Siberia, and throughout Europe; is always ſlow of motion; does not bite large animals unleſs provoked. When held up by the tail, he cannot bite the hand that holds him. The heart of a viper beats long after taken from the body; the mouth opens after the head has been cut off ſome time, and its wounds are equally dangerous as before. The venom retains its quality after ſeveral years keeping. Tobacco, and its eſſential oil, is fatal to them, as is the oil of cherry laurel.

The *black viper* differs principally in colour, but is much ſmaller: is the kind beſt known in England. Vipers are found in many parts of this iſland; but the dry, ſtony, and in particular the chalky counties, abound with them. Is chiefly diſtinguiſhed from the common black ſnake by the colour, which in the latter is more beautifully mottled; by the head, which is thicker than the body; but particularly by the tail, which in the viper, though it ends in a point, does not run tapering to ſo great a length as in the other. The viper is ſlower than moſt other ſerpents.

The young continue in the womb till in ſuch perfection as to be able to burſt from the ſhell; and are ſaid by their own efforts to creep from their confinement into the open air, where they continue for ſeveral days without taking any food whatever. "We have been often aſſured," ſays Mr. Pennant, "by intelligent people, of the truth of a fact, that the young of the viper, when terrified, will run down the throat of the parent, and ſeek ſhelter in its belly, in the ſame manner as the young of the op-



The Ceraſtes.

poſſum retire into the ventral pouch of the old one. From this," continues he, " ſome have imagined that the viper is ſo unnatural as to devour its own young; but this deſerves no credit, as theſe animals live upon frogs, toads, lizards, and young birds, which they ſwallow whole, though the morſel is often three times as thick as their own body." Of this I have received repeated information; but have never been ſo fortunate as to meet with a perſon who had diſſected a viper while thus concealing her young; or who had ever ſeen the young iſſue from their concealment. Certainly many kinds of ſerpents devour each other.

Though, when at liberty, they remain torpid throughout the winter; yet, when confined, have never been obſerved to take their annual repoſe. Their poiſon decreaſes in proportion to the length of their confinement; and it is thought the virtues of their fleſh alſo, which has been eſteemed a very powerful reſtorative medicine in battered conſtitutions. They are uſually taken with wooden tongs, by the end of the tail; but in Yorkſhire the viper catchers wear double leather gloves, and worſted ones over them, which they eſteem ample ſecurity. By the application of olive-oil their bite is ſaid to be effectually cured.

The *Viper of Egypt*, or the Aspic of ancient authors, is ſaid to poſſeſs a poiſon which kills without pain; but induces a gentle repoſe, and then a ſound ſleep, terminating in death. This is ſaid to have been therefore choſen by Cleopatra.

The Ammodytes hides in the ſand; its venom often kills in three hours time. This kind, in Africa, after having eaten their prey, fall into ſo ſound a ſleep, that they are not waked without difficulty, but lie in the paths and are trod on.

The Cerastes is ſingular by its horns: was well known to the ancient Egyptians, and inſerted among their hieroglyphics. Its horns are moveable at the will of the animal; are placed exactly over the eyes; are a little bent. The head of the Ceraſtes is flat; noſe thick and ſhort; general colour yellow; deeper-coloured blotches, in the form of bands, on the body; deepeſt on the back. About two feet long; tail ſhort; is very greedy, and devours much: then ſleeps, and is eaſily killed. Many devoured by eagles, and other birds of prey; yet they have reputation for cunning, and for hiding themſelves to ſeize their prey at advantage.

The NAJA, or *Spectacled Serpent*, is among the moſt beautiful by his colours, and the moſt fatal by his poiſon. Far from ſuppoſing him noxious, he may be viewed with pleaſure and admiration. On the back of his neck is placed a curved ſtripe, which riſing in the middle, and turning up at the ends, has ſome reſemblance to eyes, or to thoſe kind of ſpectacles which are mounted on the noſe: in reality, however, the eyes and noſe of this ſerpent are at his ſnout. General colour yellow; a broad band of brown on the junction of the neck and body; whitiſh under the belly; the ſpectacles are a white ſtripe, bordered by deep-coloured ſtripes. The upper part of his head has nine large ſcales, diſpoſed in four rows; two in the firſt, two in the ſecond, three in the third, and two in the fourth; yet this ſerpent is an exception to a rule given, and among the moſt venomous. Eyes lively and fiery; ſcales oval, flat, and lengthened; attached to the ſkin only at one part, and capable of conſiderable erection; are not ſo cloſe as to touch each other on the inflated part of the neck, but form rows, and ſhew the ſkin between them. Theſe ſcales in the ſun-ſhine glitter like burniſhed gold. The inflation of the neck is formed by the ribs, which here are longer than elſewhere, and are covered by a looſe membrane, which the ſerpent can dilate at will: this he does eſpecially when angry; at which time he is erect, and holds his head horizontally: this has the appearance of a hood, or coronet; whence he has been called the *hooded ſerpent*. The female has this extenſion, but not the ſpectacles. Generally three or four feet long, or more, ſome ſeven or eight. Ferocious and fatal; his poiſon produces convulſions or gangrene, which are ſpeedy death.

Greatly feared by the Indians; yet their mountebanks educate him to dance, and as a ſhow: going from city to city, and pretending to be preſerved by virtue of a certain root. They take their ſerpent out of the vaſe in which he is kept; then preſenting a ſtick, or often the fiſt only, he raiſes himſelf on his tail, ſwelling his *hood*, opening his chaps, and thruſting our his forked tongue, hiſſing; his eyes ſparkling, and his actions lively; he begins a kind of combat againſt his maſter, who preſenting his fiſt now to the right, now to the left, produces correſponding motions in the ſerpent; and to this he gives the idea of a dance, by ſinging and moving himſelf. The Naja endures this exerciſe for ſeveral minutes; but when his maſter perceives that his anger becomes ſerious, he withdraws his hand, ceaſes to ſing, the ſerpent lies down, and the ſhow is over. The ſerpent is brought to this by having been long accuſtomed to ſimilar provocation; and, when ſtriking at the fiſt, his vaſe is preſented

The Spectacled Serpent.

preſented quickly inſtead of it, againſt which he bruiſes his noſtrils, and hence becomes wary. Beſide this, his keeper makes him frequently bite a piece of rag, or other ſoft matter that may imbibe his venom; and they retard the freſh growth of this venom, by keeping him from moiſt food. Is worſhipped on the coaſt of Malabar. Called by the Portugueſe *Cobra di capello.*

There is a ſpeckled ſerpent in Peru. One in Brazil, whoſe mark is rather heart-ſhaped, than like ſpectacles.

The YELLOW SERPENT of Martinico is remarkable for two orifices between his eyes and noſe, which are thought to lead to the organ of hearing: if this be true, he is herein ſingular. His venom is deadly; limpid as water, but yellowiſh, like olive oil beginning to change. He is ſleepy, eſpecially if the air be cool; hides under parcels of leaves, in old trees and holes; is very fetid, and generally followed by certain birds who give the alarm. When a perſon is ſurpriſed by this ſerpent, to preſent him a branch of a tree, a parcel of leaves, or any ſuch object, takes off his attention, and gives time for ſelf-defence. Often a ſingle blow kills him. After the head is cut off, the body preſerves for ſome time a vermiculated motion. Six feet long; three inches in diameter.

The *Whip Snake* is native of the Eaſt, about five feet long, yet not much thicker than the thong of a coachman's whip. It is exceedingly venomous; and its bite is ſaid to kill in about ſix hours. To this formidable claſs might be added the Aſp; the Jaculus of Jamaica alſo, one of the ſwifteſt of the ſerpent kind; the Hæmorrhois; the Coral Serpent, which is red, and whoſe bite is ſaid to be fatal; and a number of others, ſome very partially known, many ſcarce at all. To remedy the bite of theſe animals, the Indians uſe a compoſition called in Europe Pietro de Cobra, or the Serpent Stone; and which, applied to the wound, is ſaid to draw out the venom. The compoſition of this ſtone, for it is an artificial ſubſtance, is kept a ſecret; and perhaps its effects in extracting the venom may be imaginary: nevertheleſs, it is certain that it has a power of ſticking to the ſkin, and ſucking a part of the blood from the wound. Some maintain it has great virtues, others doubt them altogether.

OF SERPENTS WITHOUT VENOM.

SERPENTS without poiſon may be diſtinguiſhed from thoſe that are venomous, by their wanting the fang teeth: their heads alſo are not ſo thick in proportion to their bodies; and in general they taper off to the tail more gradually in a point. Their teeth are ſhort, numerous, and in the ſmaller kinds perfectly inoffenſive; they lie in either jaw, as in frogs and fiſhes, their points bending backwards, the better to ſecure their prey. As inſtruments of defence, they never attempt to uſe them. Even among the largeſt, the teeth are never employed in deſperate engagements. When a hare or a bird is caught, they may ſerve to prevent ſuch ſmall game from eſcaping; but when a buffalo or a tiger is to be encountered, it is by ſtrong folds of the body, by fierce verberations of the tail, by twining round, and drawing the knot with convulſive energy.

THE SNAKE.

HITHERTO this kind of creatures has furniſhed only miſchievous reptiles, whoſe mortal poiſons, though hidden, were dreadful; miniſters of death, counteracting the principles of life. But we muſt not thus conſider all that belong to it; on the contrary, the *green and yellow ſnake* of France is ſaid to be mild, gentle, and even familiar; his colours are ſplendid and beautiful; and it is not uncommon to ſee children tie two by the tails, and drive them, in imitation of coach-horſes, where they pleaſe, not only without reſiſtance from the creatures, but with ſeeming pleaſure. They even acquire an affection for thoſe who keep them: we are told of one who knew its miſtreſs's voice and manner of laughing; came when called; followed by her ſide when walking, as if waiting orders; glided around her arms, as if careſſing her: at length he was thrown into a river to ſwim, while his miſtreſs followed in a boat; to this he kept cloſe for ſome time, ever attentive to the voice of his miſtreſs; till the turn of the tide proved too powerful, and he was drowned. Is three or four feet long. Oviparous.

The

The *Common Snake* in England is of the ſame nature; remarkably fond of milk, and is ſaid to ſuck cows when lying down.

The *Black Snake* is the largeſt of Engliſh ſerpents, ſometimes exceeding four feet in length. The neck is ſlender; the middle of the body thick; the back and ſides covered with ſmall ſcales; the belly with oblong, narrow, tranſverſe plates: the colour of the back and ſides is a duſky brown; the middle of the back marked with two rows of ſmall black ſpots, running from the head to the tail; the plates on the belly are duſky; the ſcales on the ſides are of a blueiſh white; the teeth are ſmall and ſerrated, lying on each ſide of the jaw in two rows. The whole ſpecies is perfectly inoffenſive; taking ſhelter in dunghills, and among buſhes in moiſt places; from whence they ſeldom remove, unleſs in the midſt of the day, in ſummer, when they are called out by the heat to baſk themſelves in the ſun. If diſturbed or attacked, they move away among the brambles with great ſwiftneſs; but, if too cloſely purſued, they hiſs and threaten, and thus render themſelves formidable, though incapable of offending.

Preys upon frogs, inſects, worms, mice, and young birds; and, conſidering the ſmallneſs of the neck, it is amazing how large an animal it will ſwallow. The black ſnake of Virginia, which is larger than ours, and generally grows to ſix feet long, takes a prey proportionable to its ſize; partridges, chicken, and young ducks. It is generally found in the neighbourhood of the hen rooſt, and will devour the eggs even while the hen is ſitting upon them: theſe it ſwallows whole; and often, after it has done the miſchief, will coil itſelf round in the neſt.

Are oviparous, excluding eighty or an hundred eggs at a time, which are laid in dunghills or hot-beds; the heat of which, aided by that of the ſun, brings them to maturity. During winter they lie torpid, in banks or hedges, and under old trees.

THE LADIES' SNAKE

SEEMS to enjoy a name which unites contrary ideas; few of the fair ſex, in theſe climates, being fond of this genus of animals: but, on the coaſt of Malabar, the ladies careſs this ſnake, warm him in their boſoms, keep him there without fear, and the little creature ſeems ſenſible of their good-will, and returns careſs for careſs: this is during the rainy

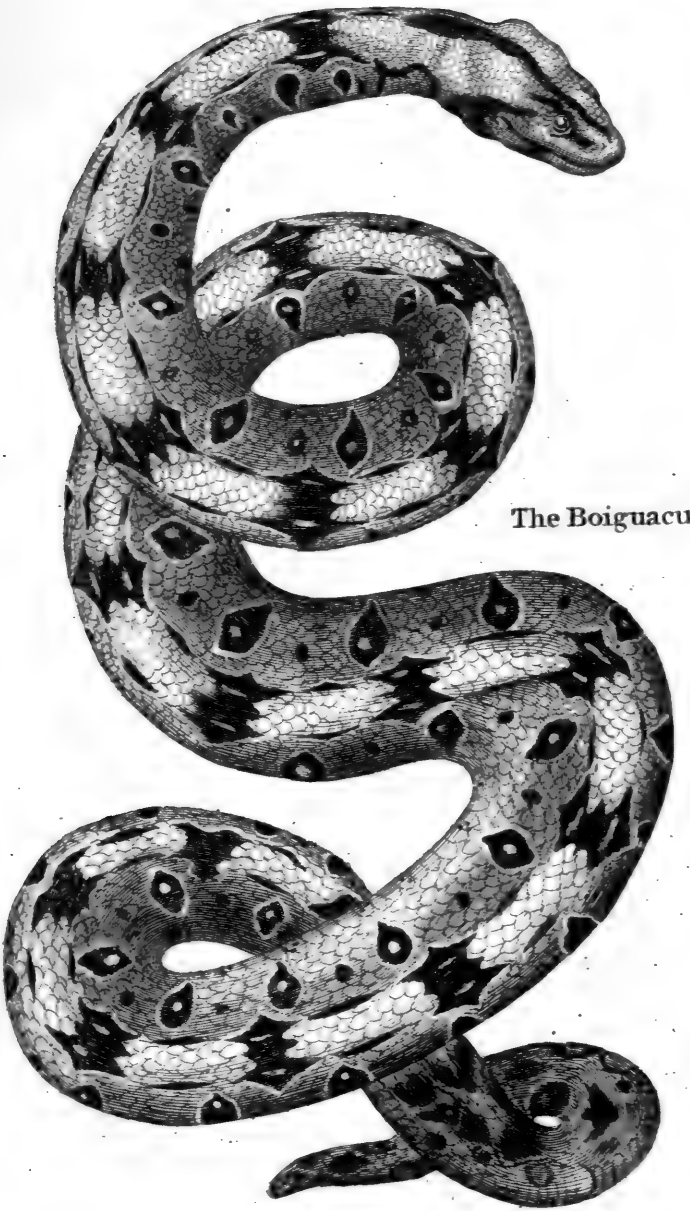
rainy ſeaſon, when the ſnake is apt to be chilled by the too great freſhneſs of the air. During the heats, they receive from him a contrary ſervice, and his coolneſs is then to them refreſhing; his poliſhed ſcales being always cooler than the atmoſphere. Is beautiful black and white, highly luſtrous; he is not fearful, nor flies when approached. Is but ſmall.

This is not the only ſerpent familiar with the human race. In ſome countries, where ſuch reptiles are common, while they deſtroy ſerpents of one kind with great animoſity, they take others into their houſes and boſoms with affection. The *Eſculapian Serpent* of Italy is among this number. It is ſuffered to crawl about the chambers, and often into the beds. It is a yellow ſerpent, about an ell long; familiar and innocent, yet will bite when exaſperated. They are ſaid to be great deſtroyers of mice; and this may be one reaſon why they are taken under human protection. The Boiga of Ceylon (it inhabits both continents alſo) is equally a favourite among the natives; and they conſider the meeting it as a ſign of good luck. They conſider themſelves as extremely happy if this animal comes into their huts. The colours of this ſerpent are ſo many and beautiful, that they ſurpaſs deſcription; and theſe perhaps are the chief inducements to the ſavages to conſider its viſits as ſo very fortunate. An equal favourite is the Japaneſe Prince of Serpents. The ſcales on the back are reddiſh, finely ſhaded, and marbled with large ſpots of irregular figures mixed with black. The fore part of the head is covered with large beautiful ſcales, the jaws bordered with yellow, the forehead marked with a black marbled ſtreak, and the eyes handſome and lively.

THE DABOIE,

THOUGH not hurtful by its poiſon or its fangs, is yet among thoſe moſt injurious to mankind, as it is the object of idolatry among the inhabitants of Whida, on the coaſt of Africa, where he has his temples, his altars, his prieſts, his donations, and his devotees; including a ſelection of beauty enjoyed in his name, but not by himſelf.

He is whitiſh on his upper parts; with great oval ſpots, reddiſh, bordered black or brown, which lie in three rows from head to tail, the ſcales on his head reſembling thoſe on his back; yet he is not venomous.



The Boiguacu.

Length three to four feet. Where he reſides, animals that might injure him are forbidden; particularly the hog, though ſo uſeful a quadruped in devouring noxious ſerpents, leaſt he ſhould devour their GOD. He is familiar to man; but has the reputation of attacking venomous ſerpents, inſects, and worms, which overrun that country: nor is he leſs eſteemed for miraculous aſſiſtance in battle, in arts, commerce, and good fortune.

THE BOIGUACU

IS the largeſt ſerpent in the world; of that kind which has the ſcales on its tail and belly ſimilar; has no venom, but ample ſtrength to counterbalance its abſence. Nature has beſtowed on this reptile, beauty, ſize, agility, ſtrength, and induſtry. As the elephant among quadrupeds, he ſurpaſſes the reſt of his order. Is commonly twenty feet long, but ſometimes forty or fifty, where food and quiet permit his growth.

His head reſembles that of a ſetting dog; the ſummit is wide; the forehead raiſed, and divided by a longitudinal hollow; his eyes are large, their orbits projecting; his mouth opens very wide; his teeth are long. This enormous reptile is diſtinguiſhed by the beauty of his ſcales, and the vivacity of their colours, which vary according to climate, age, and ſex. On the head he has a great deep-coloured or black ſpot; others are regularly ranged down him: belly aſh-coloured yellow, ſpotted black. His hiſſings are long, ſharp, and frightful: theſe are thought to be moſt frequent before ſtorms and tempeſts, perhaps before peſtilential diſtempers which ariſe from the atmoſphere; and therefore theſe have terrified into ſuperſtition the natives of Mexico, who conſider this reptile as a meſſenger of divine wrath; and floods of human gore have been offered to his image. In Africa alſo he is no leſs terrifically worſhipped, on the coaſt of Moſambique, and in Japan.

Inhabits all countries hot enough to maintain him, fertile enough to furniſh him with prey, and ſpacious enough to prevent his being frequently moleſted; formerly was known more northerly, when woods were more abundant on this ſide the Mediterranean. In Africa, the only mean of deſtroying him is by fire: ſteel avails little: but often fire is ſet to the long graſs, &c. already ſcorched by the burning ſun; this

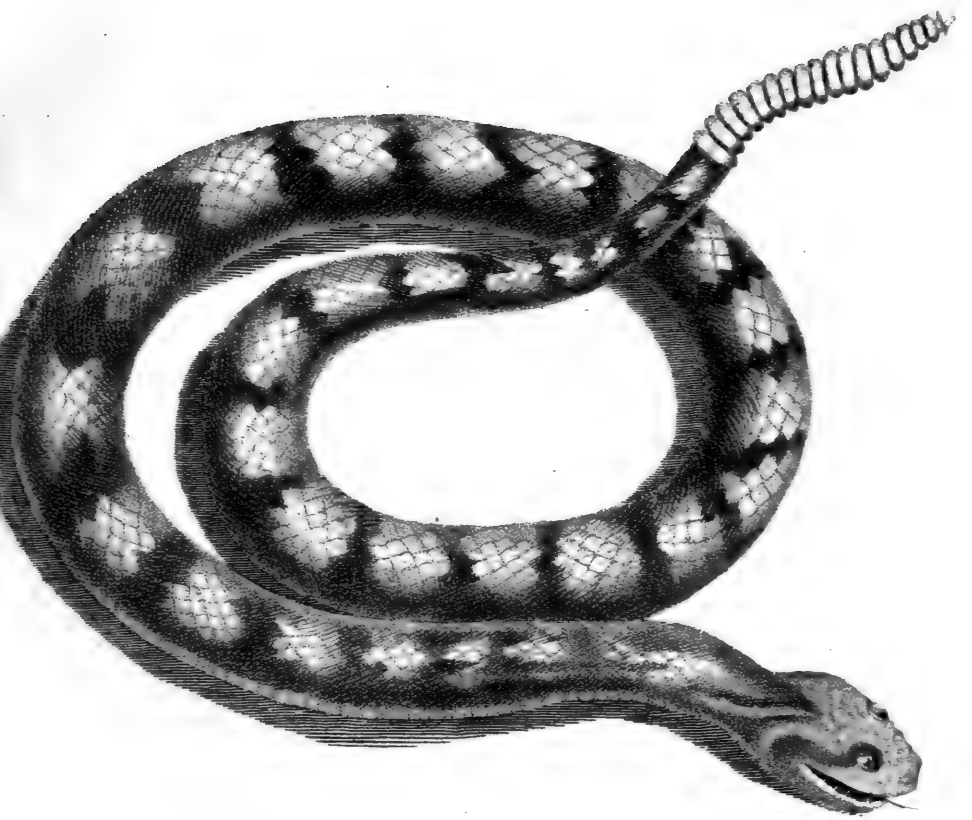
ſoon ſpreads, and interpoſes a barrier which ſtops his purſuit. He ſwims readily, even in agitated waves, in rivers, or arms of the ſea; he mounts the higheſt trees with rapidity; and, ſtationed at various heights, often waits in ambuſh the approach of prey, leaping from tree to tree. Some eat fiſh, and all devour whatever they can conquer. A ſtroke of his tail will knock down a man. He devours tigers and cougars. His manner of feeding, and condition after it, we have already noted: his inactivity is ſo fixed, that travellers have walked over him (covered as he is with leaves, &c.), or repoſed upon him, without his moving; nor has he given ſigns of life till the heat of their fire has reached him. Often large animals are placed as baits for him, and he is knocked on the head after his meal. The negroes eat his fleſh, which they highly reliſh. In other countries they wear his ſkin for clothing or ornament, as did the heroes of antiquity. Sheds his ſkin after the rainy ſeaſon; and then the ſexes ſeek each other. The egg from whence iſſues this monſter, is but two or three inches long, hatched by the ſun's heat. Its length of life unknown, probably very great; ſince to reach his ordinary dimenſions, muſt require many years.

There are others of this kind (for indeed it includes the largeſt of the ſerpent tribe); but none equal, or nearly equal, in ſize or voracity.

THE RATTLE-SNAKE.

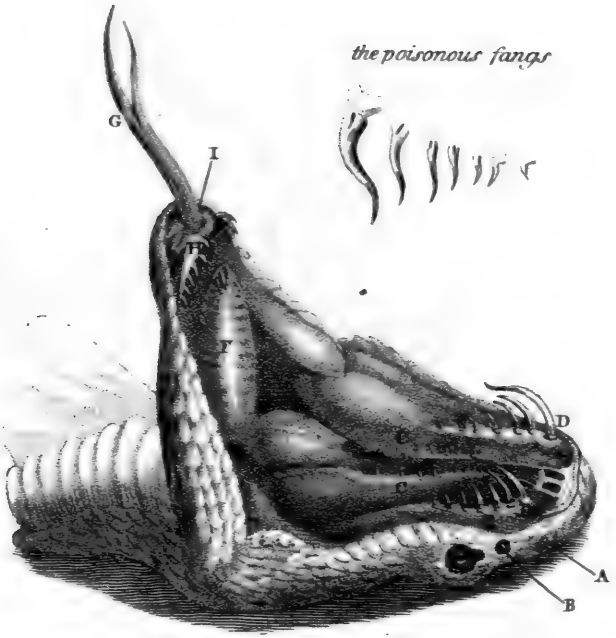
THE lion, by his roar, is not more terrific to the ſurpriſed traveller, than this ſnake by his rattles and his fetid ſmell; his poiſon is not leſs deſtructive than that of the Naja.

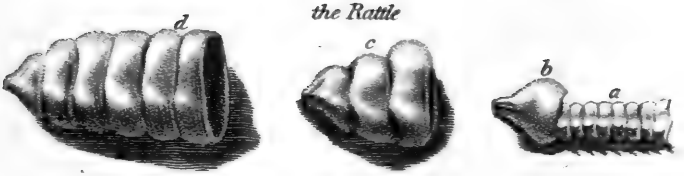
Is peculiar to America, which it inhabits from north to ſouth. Some are as thick as a man's leg, and ſix feet in length; but their moſt uſual ſize is from four to five feet long: tail four inches. In many particulars it reſembles the viper; having a flatted head, covered near the noſe with ſix ſcales, larger than their neighbours, diſpoſed in three rows croſſwiſe, two in each row. The throat is large; the tongue black, thin, forked; partly covered, and very mobile and agitable. The two bones of the ſides of the jaws are not united in front, but admit of ſeparation: its teeth turn backward, are largeſt next the noſe; their fangs reſemble thoſe of the viper. The eye ſparkles and ſhines in the dark; is furniſhed with a nictitating membrane, that preſerves it from duſt. Its



Rattle-Snake

Plate I.





Rattle-Snake.

Plate II.

ſcales are of a conſiderable degree of hardneſs, oval, and riſing in the middle. A ſingle row of ſcales under both tail and belly. They are orange-tawny, and blackiſh-coloured on the back; and of an aſh-colour on the belly, inclining to lead, with black ſpots. The male may be readily diſtinguiſhed from the female, by a black velvet ſpot on the head, and by the head being ſmaller and longer. But that which is peculiar to them is the rattle at the end of their tail, by which they make a loud rattling noiſe when they move.

This rattle is compoſed of ſeveral pieces, from one to thirty, alike in form, and often in ſize; brittle, elaſtic, ſemi-tranſparent, and of the ſame nature as the ſcales; pyramidal, having four ſides, two oppoſite larger than two others; that next the body incloſes the latter vertebra of the tail; is formed upon them, and ſeparated from them by a very thin membrane, ſo as to fit them exactly. Are hollow; each piece locks into another, being incloſed two thirds of its length in its ſucceſſor, yet ſo as to play freely in it. Neither nerve nor muſcle attaches any of theſe rattles (except that next the tail) to the ſerpent's body, but an exterior covering includes them: the furtheſt is formed firſt, the *internals* afterwards, puſhing that off gradually; the whole are very dry and brittle, and rattle by ſtriking each other: their noiſe reſembles the crackling of parchment; may be heard fifty or ſixty feet diſtance: it were deſirable that the diſtance were greater.

It is ſuppoſed by ſome that the ſnake acquires an additional bone every year; and that from hence its age may be preciſely known: but this is very uncertain, eſpecially as they eaſily break off. However this be, ſnakes of a year or two old have no rattles; while many old ones have been killed that had from eleven to thirteen; and tradition ſays, formerly ſome had thirty or more. They ſhake theſe rattles with prodigious quickneſs when diſturbed; yet the peccary and the vulture, no way terrified, haſten at the ſignal to ſeize the ſnake, as their favourite prey.

It moves along with the moſt majeſtic rapidity; neither ſeeking to offend, nor fearing inſult. Unprovoked, it meddles only with its natural prey; but when accidentally trod upon, or purſued, it makes a dreadful and deſperate defence. It folds itſelf into a circle, erects itſelf on its tail, throws back its head, and inflicts its wound in a moment; then parts, and inflicts a ſecond wound. The inſtant the wound is inflicted, though ſmall, it appears more painful than the ſting of a bee. This pain, which is ſo ſuddenly felt, far from abating, grows every moment more excruciating and dangerous: the whole body ſwells; the venom reaches the

head, which is ſoon of a monſtrous ſize; the mouth is too ſmall to contain the ſwelling tongue; the eyes are red and fiery; the heart beats quick, with frequent interruptions; the pain becomes inſupportable; devouring thirſt torments the patient, and water or drink makes it worſe; the ſpittle becomes bloody: and ſome expire under it in five or ſix hours; but others, who are of ſtronger conſtitutions, ſurvive the agony for a few hours longer, only to ſink under a general mortification which enſues, and corrupts the whole body. Sometimes ten minutes time is fatal. One that was teized and irritated to bite himſelf, died in twelve minutes.

Several remedies have been tried to alleviate this calamity. A decoction of the Virginian ſeneka, or ſnake-root, is conſidered as the moſt effectual. The Indians dip their arrows in the poiſon under the rattle-ſnake's fangs, when they deſire to take a ſignal revenge on their enemies. The Indians eat them, ſeizing them by the head, in cool weather. They do not quit their retreats till after all the ſnow is melted; at this time they are purſued with little or no danger. In ſummer they prefer hilly countries, and warm expoſures on the ſouth aſpect of a hill: hide ſometimes under fallen trees, ſo that the Americans do not croſs them if they can help it; if they muſt, they leap off from them as far as poſſible.

Eats worms, frogs, hares, ſquirrels, birds, &c. Climbs trees with facility; leaps from branch to branch, or from rock to rock; on level ground moves with heavier motion. With regard to his charming his prey, when out of reach, opinions are divided; ſome referring it to the fire and vivacity of his eyes, ſome to their being overcome by his fœtor; ſome think there is no ſuch thing, but that they have been previouſly bitten, and eſcaped; yet, being poiſoned, he awaits the effect. During rain and thunder he is moſt dreadful (not that he fears water, for he ſwims well), eſpecially as then his rattles do not ſound. Has a formidable enemy in a ſnake as large as itſelf, which is very ſtrong, and twiſts itſelf round him with ſuch contractile force as to ſqueeze him to death; hence this ſnake is called *conſtrictor:* it is not venomous, therefore its breed is encouraged. Who can tell but that in time, by the exertion of ſo many enemies, men, hogs, vultures, and fellow ſnakes, a rattle-ſnake might be conſidered as an animal merely ideal, or found only in cabinets.

There are other ſerpents having rattles in their tails. Such are the *Millet*, whoſe head has nine ſcales on it; general colour, grey: a ſmall kind. The *Dryinas*, whitiſh, ſpotted, and yellow. The *Duriſſus*. And the *Piſcivorous*, which has properly no rattle (*i. e.* of many bones), but whoſe tail terminates in a boney or cornified point, not an inch in length;

length: five or ſix feet long: he hangs on branches of trees that are ſuſpended over ſtreams, and dartsd own on fiſh that are paſſing: purſues and ſeizes them in the water, and brings them to land to devour: ſometimes falls in the ſame manner on men.

THE BLIND WORM.

THE Blind Worm is a harmleſs reptile, with a formidable appearance. Has nine large ſcales on his head; firſt one, then two; a third and fourth row, three each: his ſcales are very ſmall: his tail is longer than his body: the bones of his under jaw are not ſeparated, as in moſt ſerpents. The uſual length of this ſpecies is eleven inches, but in ſome countries three feet. The eyes are red; the head ſmall; the neck ſlender; from that part the body grows ſuddenly, and continues equal, to the tail, which ends quite blunt: the colour of the back is cinereous, marked with very ſmall lines, compoſed of minute black ſpecks; the ſides are of a reddiſh caſt; the belly duſky, and marked like the back. The motion of this ſerpent is ſlow: from which, and from the ſmallneſs of the eyes, are derived its names; ſome calling it the Slow, and ſome the Blind Worm. Like all the reſt of the kind, in our climates, they lie torpid during winter; and are ſometimes found, in vaſt numbers, twiſted together. The moſt remarkable property of this ſerpent is, that when irritated it becomes as ſtiff as a board; and, if ſmartly ſtruck in this ſtate, is eaſily broken; its muſcles being compoſed of fibres that readily ſeparate. Hence it is called by ſome the *Glaſs Snake*, and by LINNÆUS *Anguis fragilis*.

THE AMPHISBENÆ

ARE eaſily diſtinguiſhed from all other ſerpents, as they have, properly ſpeaking, no ſcales, but rings round their bodies: their upper and under ſides are ſo ſimilar, that, were their head and vent hidden, their

their back or belly could not be diſtinguiſhed. This peculiarity of rings gives them great facility in many motions of which other ſerpents are incapable; and by offering no impediment either way, but almoſt equal aſſiſtance, they can move forward or backward at pleaſure. Their tail is as round as their head; ſo that, when moving backward, no wonder they have been ſuppoſed to have a head at each end. That beſt known is the SMOKY: almoſt black, mingled with white: a foot or two in length, but ſcarce two inches of tail; his eyes very ſmall, covered by a membrane. Inhabits Ceylon and America. Eats worms, inſects, beetles, &c.; is fond of ants. His ſkin is very hard, and his muſcles ſtrong; has no fangs, conſequently is not venomous.

Another of this kind is WHITE, and often ſpotleſs.

Of ſerpents with tubercles only one kind is known: native of Java.

The *Langaha* of Madagaſcar is divided, in its length, into three different parts, by ſo many different kinds of ſcales: has alſo a horned kind of ſnout projecting. Is very venomous.

OF

OF FISHES.

IT has been thought that all fiſh are naturally of the ocean; and that ſome have mounted into freſh water by accidental migration; yet, as many cannot live in ſalt water, this is at leaſt doubtful. A few, indeed, ſwim up rivers to depoſit their ſpawn; but the great body of fiſhes keep to the ſea, and would quickly expire in freſh water.

The number of fiſh which we have named, and whoſe figure we know, according to Linnæus, is above four hundred. But of the greateſt part of theſe we know very little beſides their figure. Thoſe qualities, ſingularities, or advantages, that render animals worth our attention, are undiſcovered. The hiſtory of fiſhes, therefore, has little in it entertaining: and will detain us proportionably leſs than any ſubject yet introduced.

Moſt fiſh offer the ſame external form, ſharp at either end, and ſwelling in the middle, by which they are enabled to traverſe the fluid which they inhabit, with greater celerity and eaſe. Every part ſeems exerted in this diſpatch; the fins, the tail, and the activity of the whole back-bone; and to this flexibility fiſhes owe their great velocity. The fins aſſiſt not only in progreſſion, but in riſing, ſinking, turning, or even leaping out of the water. The *pectoral* fins, like oars, puſh the animal forward; they are placed behind the opening of the gills; generally large and ſtrong; and are to fiſh in the water what wings are to birds in the air. They alſo balance the fiſh's head, when large, and keep it from tumbling prone to the bottom; as is ſeen in large-headed fiſhes, when the pectoral fins are cut off. Next theſe are the *ventral* fins, toward the lower part of the body, under the belly: theſe always lie flat on the water; and ſerve to raiſe or depreſs the fiſh. The *dorſal* fin is ſituated along the ridge of the back; keeps it in equilibrio, and alſo aſſiſts progreſſive motion: In many this is wanting; but in all flat fiſhes it is very large, as the pectoral fins are proportionably ſmall. The *anal* fin lies between the anus and the tail; and ſerves to keep the fiſh upright. But the tail, which in ſome is flat, in others upright, ſeems the grand inſtrument of motion: the fins are ſubſervient to it, and direct its impetus.

To explain this by experiment—A carp put into a large veſſel, in a ſtate of repoſe, ſpreads all its fins, and ſeems to reſt on its pectoral and ventral fins near the bottom. If the fiſh folds up either of its pectoral fins, it inclines to

that ſide: folding the right pectoral fin, the fiſh inclines to the right ſide; folding the left fin, it inclines to the left ſide. If the fiſh deſires a retrograde motion, ſtriking with the pectoral fins, in a contrary direction, produces it. If the fiſh deſires to turn, a blow from the tail turns it; but if the tail ſtrike both ways, the motion is progreſſive. In purſuance of theſe obſervations, if the dorſal and ventral fins be cut off, the fiſh reels to right and left, and endeavours to ſupply the loſs by keeping the reſt of its fins in conſtant employment. If the right pectoral fin be cut off, the fiſh leans to that ſide; if the ventral fin on the ſame ſide be cut away, then it loſes its equilibrium entirely. When the tail is cut off, the fiſh loſes all motion, and gives itſelf up to where the water impels it. Each of theſe fins has its peculiar uſe; but all conſpire to aſſiſt each others motions. Some fiſh are poſſeſſed of all, whoſe motions are yet not the ſwifteſt. Their number, ſize, and ſituation, ſeem calculated rather to correſpond with the animal's figure, than ſolely to anſwer the purpoſes of ſpeed. Where the head is large and heavy, the pectoral fins are large and forward. Where the head is ſmall or long, the pectoral fins are ſmall, and the ventral fins wanting.

Inhabitants of the water are covered with a ſlimy glutinous matter (a ſecretion from the animal's body), that defends their bodies from the immediate contact of the ſurrounding fluid, and contributes to their eaſy progreſs through the water. Beneath this, in many kinds, is a ſtrong covering of ſcales, a ſtill more powerful defence; and under that, before we come to the muſcular parts of the body, an oily ſubſtance, which ſupplies, or rather which *includes*, the requiſite warmth.

Nature ſeems to have beſtowed on theſe animals appetites and powers of inferior kinds. Formed for paſſive exiſtence in their obſcure and heavy element, to preſerve this exiſtence, and to tranſmit it, is their whole purſuit and enjoyment. Impelled rather by neceſſity than choice, and mechanically excited to every fruition, they chaſe without diſtinction whatever they can ſwallow, conquer, or enjoy.

A ceaſeleſs deſire of food ſeems their ruling impulſe, and prompts them to encounter every danger. Their rapacity ſeems inſatiable. Even when taken out of the water, and almoſt expiring, they greedily ſwallow the very bait by which they were allured to deſtruction.

The maw is, in general, placed near the mouth; and, though poſſeſſed of no ſenſible heat, is however endued with a ſurpriſing faculty of digeſtion, ſeeming in ſome meaſure to increaſe with the quantity of food. It digeſts not only fiſh, but prawns, crabs, and lobſters, ſhells and all; though theſe ſhells are ſo much harder than the ſides of the ſtomach

which

which contains them. This amazing faculty has juſtly excited curioſity; and ſeems to ſuggeſt ſome principle in the ſtomach, yet unknown, which acts in a different manner from all kinds of artificial maceration; and which is lodged in fiſhes in a greater degree than in other creatures. Ever hungry, and ever prowling, yet no animals can ſuffer abſtinence ſo long. The gold and ſilver fiſh we keep in vaſes ſeem never to want nouriſhment: whether they feed on water-inſects too minute for our obſervation, or whether water alone is a ſufficient ſupply, is not evident; but they are often ſeen for months without apparent ſuſtenance. Whatever living thing fiſhes are able to ſwallow, becomes their food. Some, that have very ſmall mouths, feed upon worms and ſpawn of other fiſh: others, whoſe mouths are larger, ſeek larger prey. Thoſe with the largeſt mouths purſue almoſt every thing that has life; and often meet each other in fierce oppoſition; when the fiſh with the largeſt ſwallow enjoys the victory, and devours its antagoniſt.

Thus the life of a fiſh is one ſcene of hoſtility, violence, and evaſion. The ſmaller fry eſcape, by ſwimming into thoſe ſhallows where the greater are unable to purſue. Yet, even in the ſhallows, the muſſel, the oyſter, and the ſcallop, lie in ambuſh at the bottom, with their ſhells open; and whatever little fiſh inadvertently approaches into contact, they cloſe their ſhells upon, and devour. The purſuit of fiſhes is not confined to a ſingle region, or to one effort: ſhoals of one ſpecies follow thoſe of another through vaſt tracts of ocean, from the vicinity of the pole down to the equator. The cod, from the banks of Newfoundland, purſues the whiting even to the ſhores of Spain. The cachalot purſues herrings, and ſwallows thouſands at a gulp.

This may be one cauſe of the annual migration of fiſhes; but fiſhes may be induced to change their place of reſidence for one more ſuited to their conſtitutions, or more adapted to depoſiting their ſpawn. No fiſh are fond of *very cold* water, but frequent places where it is warmeſt. In ſummer, they aſſemble in the ſhallows where the ſun has power to warm the water to the bottom; in winter, they are found deeper.

All fiſh require air for their ſupport. The whale kind breathe, and come to the ſurface every two or three minutes for freſh inſpiration: but thoſe which continue entirely under water, if totally deprived of air, will expire in a very few minutes. Thus all the fiſh of a pond die, when the ice every where covers the ſurface, and keeps off the air. If a hole be made in the ice, the fiſh will be ſeen to come all to that part, for the

benefit of a freſh ſupply: yet nothing is more difficult to be accounted for than the manner in which they obtain this ſupply. Fiſh in the water have a motion of their lips and gills, or at leaſt of the bones on each ſide that cover them. This motion is, without doubt, analogous to our breathing; yet it is not air, but water, that the fiſh actually ſucks in. Their manner of breathing is probably thus: The fiſh firſt takes a quantity of water at the mouth, which is driven to the gills; theſe cloſe, and keep the water ſo ſwallowed from returning by the mouth; while the bony covering of the gills prevents it from going through them, until the animal has drawn the proper quantity of air from the water thus impriſoned: then the bony covers open, and diſcharge it; the gills alſo admit a freſh quantity of water. Should the fiſh be prevented from the free play of its gills, or ſhould the bony covers be kept from moving, by a ſtring tied round them, the animal would fall into convulſions, and die.

The air-bladder may ſerve to contain this air for vital purpoſes; as well as contribute to enabling the fiſh to riſe and ſink in the water at pleaſure, as it is dilated or compreſſed. The air-bladder is a bag filled with air, ſometimes compoſed of one, ſometimes of two, and ſometimes three diviſions, ſituated towards the back of the fiſh, and opening into the maw or the gullet. Some fiſh have an air-bladder that continually crawl at the bottom, ſuch as the flounder; and ſome are without it that ſwim at eaſe in every depth; ſuch as the anchovy and gudgeon. Its neceſſity then is not always equally ſtrong.

"Moſt of the diſorders incident to mankind," ſays Bacon, "ariſe from the changes and alterations of the atmoſphere: but fiſhes reſide in an element little ſubject to change; theirs is an uniform exiſtence; their movements are without effort, and their life without labour. Their bones alſo, which are united by cartilages, admit of indefinite extenſion; and the different ſizes of animals of the ſame kind among fiſhes is very various. They ſtill keep growing; their bodies, inſtead of ſuffering the rigidity of age, which is the cauſe of natural decay in land animals, ſtill continue increaſing with freſh ſupplies; and, as the body grows, the conduits of life furniſh their ſtores in greater abundance. How long a fiſh, that ſeems to have ſcarce any bounds put to its growth, continues to live, is not aſcertained; perhaps the life of a man would not be long enough to meaſure that of the ſmalleſt."

When a fiſh's ſcale is examined through a microſcope, it will be found to conſiſt of a number of circles, one circle within another, in ſome meaſure reſembling thoſe which appear upon the tranſverſe ſection of a tree,

tree, and ſuppoſed to offer the ſame information: for, as in trees we can tell their age by the number of their circles, ſo in fiſhes we can tell theirs by the number of circles in every ſcale, reckoning one ring for every year of the animal's exiſtence. By this method M. Buffon found a carp, whoſe ſcales he examined, to be not leſs than an hundred years old. Geſner brings us an inſtance of one of the ſame age; and Albertus of one more than double that period. The age of the ſkate and the ray, that want ſcales, may be known by ſeparating the joints of the back-bone, and then minutely obſerving the number of rings which the ſurface, where it was joined, exhibits. But theſe methods may be, and probably are, very imperfect.

But their longevity is nothing, compared to their fecundity. All (a few of the larger excepted) multiply by hundreds, and ſome by millions. Some bring forth their young alive; ſome produce eggs: the former are the leaſt fruitful, yet even theſe produce two or three hundred at a time. Thoſe that produce eggs, which they leave at the bottom of the water, or floating on the ſurface, are much more prolific: of theſe eggs few riſe to life; they are devoured by the leſſer fry, by aquatic birds, and by the larger fiſh. Still, however, there are enough for ſupplying the deep with inhabitants. The cod ſpawns in one ſeaſon, as Lewenhoeck aſſures us, above nine million of eggs, or peas, contained in one ſingle roe. The flounder is commonly known to produce above one million; and the mackarel above five hundred thouſand. Such an amazing increaſe, if permitted to come to maturity, would overſtock nature, and the ocean itſelf would not be able to contain the half of its inhabitants. But two wiſe purpoſes are anſwered by this amazing increaſe; it preſerves the ſpecies in the midſt of numberleſs enemies, and ſerves to furniſh the reſt with a ſuſtenance adapted to their nature.

Fiſh have different ſeaſons for depoſiting their ſpawn: ſome that live in the depths of the ocean, are ſaid to chooſe the winter; but in general they chooſe ſummer. They leave the ocean, and ſhoal round the coaſts, or ſwim up the freſh-water rivers, which are warm as they are comparatively ſhallow. When they have depoſited their burthens, they then return to their old ſtations, and leave their naſcent progeny to ſhift for themſelves.

The ſpawn continues in its egg-ſtate in ſome fiſh longer than in others, and this in proportion to the animal's ſize. In the ſalmon, the young continue in the egg from the beginning of December till the beginning of April; the carp continues in the egg not above three weeks; the little

gold fiſh from China is ſtill quicker. Theſe at firſt eſcape by their minuteneſs and agility. They riſe, ſink, and turn, much readier than grown fiſh; and they can eſcape into very ſhallow waters when purſued.

But there are ſome that have all the tenderneſs of birds or quadrupedes for their young; that nurſe them with conſtant care, and protect them from every injury: of this diſpoſition are the *cetaceous* or whale kind; they bring them alive into the world, and defend them with courage and activity: alſo, in part, the *cartilaginous* kinds, which have griſtles inſtead of bones. But the tribe we have been deſcribing, that leave their ſpawn without protection, are called the *ſpinous* or bony kind, from their bones reſembling the ſharpneſs of thorns.

The *cetaceous*, the *cartilaginous*, and the *ſpinous*, differ from each other in conformation, appetites, bringing forth, and in the education of their young. Theſe three great diſtinctions are ſtrongly and firmly marked in nature.

OF CETACEOUS FISHES.

THIS tribe compriſes the Whale, the Cachalot, the Dolphin, the Grampus, and the Porpeſſe. All theſe reſemble quadrupedes in their internal ſtructure, and in ſome of their appetites and affections. They have lungs, a midriff, a ſtomach, inteſtines, liver, ſpleen, bladder, &c. Their heart alſo reſembles that of quadrupedes, with its partitions cloſed up, as in them, and driving red and warm blood in circulation through the body. Every internal part bears a moſt ſtriking ſimilitude; and, to keep theſe parts warm, the whole kind are covered, between the ſkin and the muſcles, with a thick coat of fat or blubber, like the bacon-fat of a hog. As theſe animals breathe, they are conſtrained, every two or three minutes, to come up to the ſurface to take breath, as well as to ſpout out through their noſtril what water they have ſucked in. This conduit is placed in the head, a little before the brain. Though externally the hole is ſingle, it is internally divided by a bony partition, which is cloſed by a ſphincter muſcle on the inſide, that ſhuts it up at the pleaſure of the animal. Another muſcle or valve prevents the water from going down the gullet. When therefore a quantity of water is neceſſary to be diſcharged, it ſhuts the

the mouth, cloſes the valve of the ſtomach, opens the ſphincter at the noſtril, and then breathing ſtrongly, drives out the water.

Their eyes have eyelids, as in man; it is moſt likely that they can hear, as they certainly utter ſounds, and bellow to each other. This vocal power would be needleſs to animals naturally deaf. The female ſuckles in the manner of quadrupedes, her breaſts being placed above the navel.

The number of their fins never exceeds three; *i. e.* two pectoral fins, and one back fin; but in ſome ſorts the laſt is wanting. Theſe fins are made up of bones and muſcles; and their ſkeleton reſembles that of a man's hand. Their tails alſo are placed ſo as to lie flat on the ſurface of the water; not upright or edgeways. This flat poſition of the tail enables them to force themſelves ſuddenly to the ſurface.

Some are without teeth, properly called whales; others have teeth only in the lower jaw, and are called by the French *cachalots:* the narwhal has teeth only in the upper jaw; the dolphin, porpeſſe, and grampus have teeth both above and below.

OF THE WHALE.

WE now no longer hear of whales two hundred, and two hundred and fifty feet long, which were often ſeen two centuries ago. They have been deſtroyed by mankind, and the ſpecies is dwindled into a race of diminutive animals, from thirty feet to eighty. Taking the whale at his ordinary ſize of eighty feet long and twenty feet high, what an enormous animated maſs it appears! Yet this great creature gambols in the deep, with the eaſe and agility of the ſmalleſt animal, and makes its way with incredible ſwiftneſs! Though this be wonderful, perhaps greater wonders are concealed in the deep. Who knows the ſize of thoſe that remain conſtantly under water, and that have been increaſing in magnitude for centuries? to receive all that has been ſaid of the ſea-ſerpent, or the Kraken, would be credulity; to reject all, or to deny the poſſibility of their exiſtence, would be preſumption.

The whale is the largeſt animal of which we have any certain information; there are ſeven different kinds; the Great Greenland Whale, without a back fin, and black on the back; the Iceland Whale, without a back fin, and whitiſh on the back; the New England Whale, with a hump on the back; the Whale with ſix humps on the back; the Fin-fiſh,

with a fin on the back near the tail; the Pike-headed Whale, and the Round-lipped Whale. The fin-fiſh having a larger ſwallow than the reſt, is more active, ſlender, and fierce, living chiefly upon herrings. However they are none of them very voracious.

The Great Greenland Whale is the fiſh the taking which is ſuch an object in different parts of Europe. It is a large heavy animal, and the head alone makes a third of its bulk. The fins on each ſide are from five to eight feet, compoſed of bones and muſcles. The tail about twenty-four feet broad; and when the fiſh lies on one ſide, its blow is tremendous. The ſkin is ſmooth and black, and, in ſome places, marbled with white and yellow; which, running over the ſurface, has a very beautiful effect. This marbling is particularly obſervable in the fins and the tail.

The whale uſes only the tail to advance in the water, and it is ſurpriſing to ſee with what force and celerity its enormous bulk divides the ocean. The fins are only uſed for turning, and directing the velocity impreſſed by the tail. The female alſo uſes them, when purſued, to bear off her young, clapping them on her back, and ſupporting them by the fins on each ſide from falling.

The outward or ſcarf ſkin of the whale is no thicker than parchment; but, this removed, the real ſkin appears, an inch thick, and covering fat or blubber from eight to twelve inches in thickneſs; of a beautiful yellow. The muſcles lie beneath; and theſe, like the fleſh of quadrupedes, are very red and tough.

The mouth is above twenty feet long, the upper jaw furniſhed with barbs, the greateſt in the middle, the ſmalleſt toward the ſides. Theſe are the whale-bone; the longeſt ſpars of which are eighteen feet. The tongue is almoſt immoveably fixed to the lower jaw, ſeeming one great lump of fat; and, in fact, it fills ſeveral hogſheads with blubber. The eyes are not larger than thoſe of an ox; and when the cryſtalline humour is dried, it does not exceed a pea. They are placed towards the back of the head, being the moſt convenient ſituation for enabling them to ſee, both before and behind; as alſo to ſee over them, where their food is principally found. They are guarded by eye-lids and eye-laſhes, and they ſeem to be very ſharp-ſighted. As ſoon as the thin ſcarf-ſkin above mentioned is removed, a black ſpot is diſcovered behind the eye; under that is the auditory canal, leading to a regular apparatus for hearing. In ſhort, the animal hears the ſmalleſt ſounds at very great diſtances, and

at

at all times, except when it is ſpouting water; which is the time that the fiſhers approach to ſtrike it.

The ſpout-holes or noſtrils in this whale are two; one on each ſide the head, before the eyes, and crooked, ſomewhat like the holes on the belly of a violin. From theſe holes this animal blows the water very fiercely, and with ſuch a noiſe that it roars like a hollow wind, and may be heard at three miles diſtance. When wounded, it then blows more fiercely than ever, ſo that it ſounds like the roaring of the ſea in a great ſtorm.

The real bones are hard, like thoſe of great land animals, very porous, and filled with marrow. Two great ſtrong bones ſuſtain the under lip, lying againſt each other in the ſhape of a half-moon: ſome of theſe are twenty feet long.

The whale goes with young nine or ten months, and is then fatter than uſual, particularly when near the time of bringing forth. The cub, when excluded, is black, and about ten feet long. When ſhe ſuckles her young, ſhe throws herſelf on one ſide, on the ſurface of the ſea, and the young one attaches itſelf to the teat. The breaſts are two, generally hid within the belly; but ſhe can produce them at pleaſure, ſo as to ſtand forward a foot and a half, or two feet; and the teats are like thoſe of a cow. In ſome, the breaſts are white; in others ſpeckled; in all, filled with a large quantity of milk, reſembling that of land animals. The young continue at the breaſt for a year; during which time they are called by the ſailors *ſhort-heads*. They are then extremely fat, and yield above fifty barrels of blubber. The mother, at the ſame time, is equally lean and emaciated. At the age of two years they are called *ſtunts*, as they do not thrive much immediately after quitting the breaſt; they then yield ſcarce above twenty or twenty-four barrels of blubber: from that time forward they are called *ſkull-fiſh*, and their age is wholly unknown.

Every ſpecies of whale propagates only with thoſe of its own kind, and does not at all mingle with the reſt: however, they are generally ſeen in ſhoals of different kinds together, and make their migrations in large companies from one ocean to another. They are a gregarious animal, which implies their want of mutual defence againſt the invaſions of ſmaller, but more powerful fiſhes.

They cannot ſwallow large fiſhes, as their throat is ſo narrow that an animal larger than a herring could not enter. How then do they ſubſiſt and grow ſo fat? A ſmall inſect which is ſeen floating in thoſe ſeas, and which Linnæus terms the Meduſa, is ſufficient for this ſupply. Theſe

inſects are black, and of the ſize of a ſmall bean, and are ſometimes ſeen floating in cluſters on the ſurface of the water. They are round, like ſnails in a box; but they have wings, which are ſo tender that it is ſcarce poſſible to touch them without breaking. Theſe ſerve rather for ſwimming than flying; and the little animal is called by the Icelanders the Walfiſchoas, which ſignifies the whale's provender. They have the taſte of raw muſſels, and have the ſmell of burnt ſugar. Theſe are the food of the whale, which it is ſeen to draw up in great numbers with its huge jaws, and to bruiſe between its barbs, which are always found with ſeveral of theſe ſticking among them.

As the whale is an inoffenſive animal, it is not to be wondered that it has many enemies, willing to take advantage of its diſpoſition, and inaptitude for combat. There is a ſmall animal, of the ſhell-fiſh kind, called the Whale-louſe, that ſticks to its body, and inſinuates itſelf chiefly under the fins; and whatever efforts the great animal makes, it ſtill keeps its hold, and lives upon the fat. The ſaw-fiſh, however, is the whale's moſt terrible enemy. At the ſight of this animal, ſays Anderſon, the whale ſeems agitated in an extraordinary manner; leaping from the water as if with affright: wherever it appears, the whale perceives it at a diſtance, and flies from it. "I have been myſelf," continues he, "a ſpectator of their terrible encounter. The whale has no inſtrument of defence except the tail; with that it endeavours to ſtrike the enemy; and a ſingle blow taking place, would effectually deſtroy its adverſary: but the ſaw-fiſh is as active as the other is ſtrong, and eaſily avoids the ſtroke; then bounding into the air, it falls upon its great ſubjacent enemy, and endeavours, not to pierce with its pointed beak, but to cut with its toothed edges. The ſea all about is ſoon dyed with blood, proceeding from the wounds of the whale; while the enormous animal vainly endeavours to reach its invader, and ſtrikes with its tail againſt the ſurface of the water, making a report at each blow louder than the noiſe of a cannon."

There is ſtill another and more powerful enemy, called, by the fiſhermen of New England, the Killer. This is itſelf a cetaceous animal, armed with ſtrong and powerful teeth. A number of theſe are ſaid to ſurround the whale, in the ſame manner as dogs get round a bull. Some attack it with their teeth behind; others attempt it before; until, at laſt, the great animal is torn down, and its tongue is ſaid to be the only part they devour when they have made it their prey. They are ſaid to be of ſuch great ſtrength, that one of them alone was known to ſtop a dead whale that

The Saw-fiſh

that ſeveral boats were towing along, and drag it from among them to the bottom.

But of all the enemies of theſe enormous fiſhes, man is the greateſt: he alone deſtroys more in a year than the reſt in an age, and actually has thinned their numbers in that part of the world where they are chiefly ſought. The European ſhips, ſoon after the improvement of navigation, found the way into thoſe ſeas; and as early as the beginning of the fourteenth century, the Biſcayners were in poſſeſſion of a very conſiderable trade to the coaſt of Greenland. The Dutch and the Engliſh followed them thither, and ſoon took that branch of commerce out of their hands. At preſent, the quantity of fiſh are ſo greatly reduced, by conſtant capture for ſuch a vaſt length of time, that we croſs the line, and voyage to the South Pole, for what we uſed to find in the North.

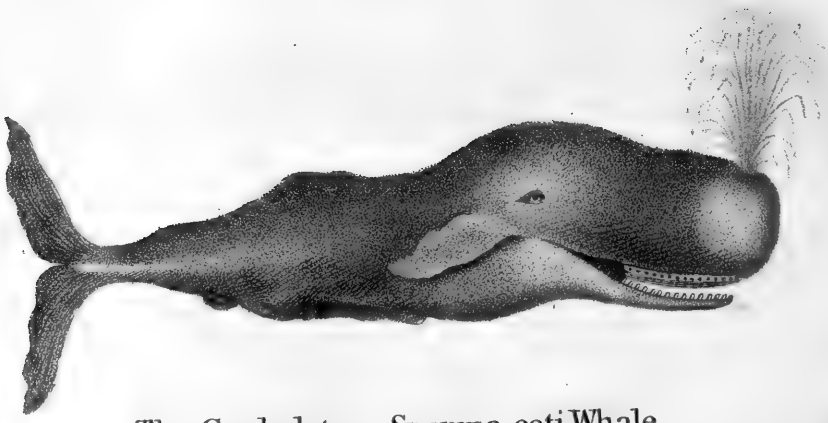
When arrived at the part where the whales are expected, the ſhips always keep their ſails ſet; and a ſailor is placed at the maſt-head, to give information when he ſpies a whale. As ſoon as he diſcovers one, the whole crew are inſtantly in employment: they fit out their boats, and row to where the whale was ſeen. The harpooner, who is to ſtrike the fiſh, ſtands at the prow of the boat, with an harpoon or javelin in his hand, five or ſix feet long, pointed with ſteel like the barb of an arrow, of a triangular ſhape. As this perſon's place is that of the greateſt dexterity, ſo alſo it is of the greateſt danger: the whale ſometimes overturns the boat with a blow of its tail, and ſometimes drives againſt it with fury. In general, however, the animal ſeems to ſleep on the ſurface of the water; while the boat approaching, the harpooner ſtands aloft, and, with his harpoon tied to a cord of ſeveral hundred fathom length, darts it into the animal, and then rows as faſt as poſſible away. It is ſome time before the whale ſeems to feel the blow; the inſtrument has uſually pierced no deeper than the fat; and, that being inſenſible, the animal continues for a while motionleſs: but ſoon rouſed from its ſeeming lethargy, as the ſhaft continues to pierce deeper and deeper into the muſcular fleſh, it flies off with amazing rapidity. In the mean time, the harpoon ſticks in its ſide; while the rope, which is coiled up in the boat, and runs upon a ſwivel, lengthens as the whale recedes, but ſtill ſhews the part of the deep to which it has retreated. This cord is coiled with great care: for ſuch is the rapidity with which it runs off, that if it was but the leaſt checked, as it follows the animal's retreat, it would infallibly overſet the boat, and the crew would go to the bottom. It ſometimes happens alſo, that the rapidity with which it runs over the ſwivel at the edge of the boat, heats it, and it would

would certainly take fire, did not a man ſtand continually with a wet mop in his hand, to cool the ſwivel as the cord runs. The whale having dived to a conſiderable depth, remains at the bottom, ſometimes for near half an hour, with the harpoon in its belly; and then riſes to take breath, ſuppoſing the danger over: but the inſtant it appears, they are all with their boats ready to receive it, and fling their harpoons into its body: the animal again dives and again riſes, while they repeat their blows. The ſhip follows in full ſail, like all the reſt, never loſing ſight of the boats, and ready to lend them aſſiſtance; the whole ocean ſeems dyed in blood. Thus they renew their attack, till the whale begins to be quite enfeebled and ſpent; when they plunge their longer ſpears into various parts of its body, and the enormous animal expires. When it is dead, to prevent it from ſinking, they tie it with a ſtrong iron chain to the ſide of the boat; and either cut it up in pieces, and carry it home in that manner; or extract the oil from the blubber on ſhip-board.

THE NARWHAL.

FROM whales that entirely want teeth, we come to one that has them in the upper jaw only; the Narwhal or Sea-unicorn. Not ſo large as the whale, about ſixty feet long. Slenderer than the whale, and not ſo fat. Diſtinguiſhed by its tooth or teeth, which ſtand pointing directly forward from the upper jaw, from nine to fourteen feet long. This terrible weapon is generally ſingle; but there is the ſkull of a Narwhal at the Stadthouſe at Amſterdam with two. It is as ſtraight as an arrow, about the thickneſs of the ſmall of a man's leg, wreathed, tapering to a ſharp point; and is whiter, heavier, and harder than ivory. Its root enters into the ſocket above a foot and a half. When the animal poſſeſſed of theſe formidable weapons is urged to employ them, it drives directly forward againſt the enemy with its teeth, that, like protended ſpears, pierce whatever ſtands before them. Both ſexes are found armed in this manner; the horn is ſometimes wreathed, and ſometimes ſmooth; ſometimes a little bent, and ſometimes ſtraight; but always ſtrong, deeply fixed, and ſharp-pointed. Yet the narwhal is one of the moſt harmleſs and peaceful inhabitants of the ocean. Conſtantly and inoffenſively

ſporting



The Cachalot, *or,* Sperma-ceti Whale.

ſporting among the other great monſters of the deep, no way attempting to injure them, but pleaſed in their company. Wherever it is ſeen, the whale is ſhortly after ſure to follow. This may ariſe as well from the natural paſſion for ſociety in theſe animals, as from both living upon the ſame food, the inſects above deſcribed.

The Narwhal has a much narrower gape than the Great Whale; and therefore does not want the uſe of barbs to keep in its food when once ſucked into the mouth. It is alſo much ſwifter, and would never be taken but for thoſe very tuſks, which at firſt appear to be its principal defence. Theſe animals, as was ſaid, being fond of living together, are always ſeen in herds of ſeveral at a time; and whenever they are attacked, they crowd together in ſuch a manner, that they are mutually embarraſſed by their tuſks. By theſe they are often locked together, and are prevented from ſinking to the bottom. It ſeldom happens, therefore, but the fiſhermen make ſure of one or two of the hindmoſt, which very well reward their trouble.

THE CACHALOT.

THE Cachalot, often called the Spermaceti Whale, has ſeveral teeth in the under jaw, but none in the upper. There are ſeven diſtinctions in this tribe. The Cachalot with two fins and a black back; that with two fins, and a whitiſh back; that with a ſpout in the neck; that with a ſpout in the ſnout; that with three fins and ſharp-pointed teeth; that with three fins and ſharp-edged teeth; and, laſtly, the Cachalot with three fins and flatted teeth.

This tribe is not above ſixty feet long, and ſixteen feet high; more ſlender, and much more active, than the Whale; they remain a longer time at the bottom, and afford a ſmaller quantity of oil. The head is ſo large as to make one half of the whole. The tongue is ſmall: but the throat very formidable; and with very great eaſe it could ſwallow an ox. In its ſtomach are found loads of fiſh of different kinds; ſome whole, ſome half digeſted, ſome eight or nine feet long; for the Cachalot can at one gulp ſwallow a ſhoal of fiſhes

enormous gullet. Linnæus tells us that this fiſh purſues and terrifies dolphins and porpeſſes ſo much, as often to drive them on ſhore.

It furniſhes two very precious drugs; ſpermaceti, and, ſome ſay, ambergriſe. The capture of this animal, that alone ſupplies them, therefore turns out very advantageous, particularly ſince the art has been found out of converting all the oil of this animal, as well as the brain, into that ſubſtance called ſpermaceti. This ſubſtance is found in the head of the animal, and is the brain. The outward ſkin of the head being taken off, a covering of fat offers, about three inches thick; and under that, inſtead of a bony ſkull, the animal has only another thick ſkin, that ſerves for a covering and defence of the brain. The firſt cavity, or chamber, of the brain, is filled with that ſpermaceti which is ſuppoſed of the greateſt purity and higheſt value. From this cavity there are generally drawn about ſeven barrels of the cleareſt ſpermaceti; that thrown upon water coagulates like cheeſe. Below this there is another chamber juſt over the gullet, which is about ſeven feet high; and this alſo contains the drug, but of leſs value. It is diſtributed in this cavity like honey in a hive, in ſmall cells, ſeparated from each other by a membrane like the inner ſkin of an egg. In proportion as the oily ſubſtance is drawn away from this part, it fills anew from every part of the body: and from this is generally obtained about nine barrels of oil. Beſides this, the ſpinal marrow, which is about as thick as a man's thigh, and reaches all along the back-bone to the tail, where it is not thicker than one's finger, affords no inconſiderable quantity.

Ambergriſe, which is ſaid to be ſometimes found in this whale, was long conſidered as a ſubſtance found floating on the ſurface of the ſea; but time has diſcovered that it chiefly belongs to this animal; is found in the place where the ſeminal veſſels are uſually ſituated in other animals, in a bag of three or four feet long, in round lumps, from one to twenty pounds weight, floating in a fluid rather thinner than oil, and of a yellowiſh colour. There are never ſeen more than four at a time in one of theſe bags; and that which weighed twenty pounds, and which was the largeſt ever ſeen, was found ſingle. Theſe balls are not found in all fiſhes of this kind, but chiefly in the oldeſt and ſtrongeſt.

THE

THE DOLPHIN, GRAMPUS, AND PORPESSE.

ALL theſe fiſh have teeth both in the upper and the lower jaw, and are much leſs than the whale.

The GRAMPUS exceeds twenty feet; is diſtinguiſhed by the flatneſs of its head, which reſembles a boat turned upſide down.

The PORPESSE reſembles the Grampus, except in being only half its length; its ſnout alſo more reſembles that of an hog.

The DOLPHIN has a ſtrong reſemblance to the porpeſſe, but its ſnout is longer and more pointed.

They have all fins on the back; heads very large, like the reſt of the whale kind; and reſemble each other in appetites, manners, and conformation; equally voracious, active, and roving. All this tribe, and the dolphin in particular, are not leſs ſwift than deſtructive. No fiſh could eſcape them, but from the aukward poſition of the mouth, which is placed in a manner under the head; yet, even with theſe diſadvantages, their depredations are ſo great, that they have been juſtly ſtyled the plunderers of the deep. What could induce the ancients to a predilection in favour of the Dolphin, it is not eaſy to account for. The ancient painters and ſculptors have univerſally drawn them wrong. A Dolphin is ſcarce ever exhibited by them ſtraight, but curved, in the poſition which they ſometimes appear in, when exerting their force out of their natural element.

They are found, the porpeſſe eſpecially, in ſuch vaſt numbers, in all parts of the ſea that ſurrounds this kingdom, that they are ſometimes noxious to ſeamen, when they ſail in ſmall veſſels. In ſome places they almoſt darken the water as they riſe to take breath; and particularly before bad weather are much agitated, ſwimming againſt the wind, and tumbling about with unuſual violence. It is probable they dread thoſe ſeaſons of turbulence, when the leſſer fiſhes ſhrink to the bottom, and their prey no longer offers in ſufficient abundance. In fairer weather they herd together, purſuing ſhoals of various fiſh with great impetuoſity. Their method of hunting their game, if it may be ſo called, is to follow in a pack, and give each other mutual aſſiſtance. At that ſeaſon when the mackarel, the herring, the ſalmon, and other fiſh of paſſage, begin to make their appearance, the cetaceous tribes are ſeen fierce in the purſuit; urging their prey from one creek or bay to another, deterring them from the ſhallows, driving them towards each other's am-

buſh, and uſing a greater variety of arts than hounds are ſeen to exert in purſuing the hare. However, the porpeſſe not only ſeeks for prey near the ſurface, but often deſcends to the bottom in ſearch of ſand-eels and ſea-worms, which it roots out of the ſand with its noſe, in the manner hogs harrow up the fields for food. For this purpoſe, the noſe projects a little, is ſhorter and ſtronger than that of the dolphin; and the neck is furniſhed with very ſtrong muſcles, which enable it the readier to turn up the ſand.

They are often taken in the Thames at London, both above the bridges and below them. It is curious to obſerve with what activity they avoid their purſuers, and what little time they require to fetch breath above the water. The Porpeſſe yields a very large quantity of oil; and the lean of ſome, particularly if the animal be young, is ſaid to be as well taſted as veal.

Go with young ten months; ſeldom bring above one at a time, and in the midſt of ſummer: they live to a conſiderable age (though ſome ſay not above twenty-five or thirty years); and ſleep with the ſnout above water. They ſeem to poſſeſs, in a degree proportioned to their bulk, the manners of whales.

OF CARTILAGINOUS FISHES.

THEIR firſt great diſtinction is, in having cartilages or griſtles inſtead of bones. Age, that hardens the bones of other animals, rather contributes to ſoften theirs. The ſize of all fiſhes increaſes with age; but, from the pliancy of the bones in this tribe, they ſeem to have no bounds to their dimenſions: and it is ſuppoſed that they grow larger till they die. Cartilaginous fiſhes, like the cetaceous tribes, have organs of hearing, and lungs; like the ſpinous kinds, they have gills, and a heart without a partition; thus poſſeſſing a two-fold power of breathing. This double capacity of breathing, is one of the moſt remarkable circumſtances in the hiſtory of nature. The apertures by which they breathe, are placed about the head; either beneath, as in flat fiſh; on the ſides, as in ſharks; or on the top of the head, as in pipe-fiſh. To theſe apertures are the gills affixed, but without any bone to open and ſhut them, as in ſpinous fiſhes, from which they may be eaſily diſtinguiſhed by this mark. From theſe are bending cylindrical ducts, that run to the lungs, and are ſuppoſed to convey the air that gives the organs their proper play.

From this ſtructure, they are enabled to live longer out of water than thoſe

Great Shark.

thoſe whoſe gills are more ſimple, often ſeveral hours; or they can remain continually under water, without taking breath. Some bring forth their young alive; and ſome bring forth eggs. The young, while in the body, continue in the egg till a very little time before they are excluded: ſo that theſe eggs they may properly be ſaid to hatch within the body. The eggs conſiſt of a white and a yolk; and have a ſubſtance, inſtead of ſhell, that may be compared to ſoftened horn.

Cartilaginous fiſhes may be divided, firſt into thoſe of the ſhark kind, with a body growing leſs towards the tail, a rough ſkin, the mouth placed far beneath the end of the noſe, five apertures on the ſides of the neck for breathing, and the upper part of the tail longer than the lower.

The next diviſion is that of flat fiſh; whoſe broad, flat, thin ſhape ſufficiently diſtinguiſhes them. They may be eaſily known from ſpinous flat fiſh, by the holes through which they breathe, which are uncovered by a bone; and which, in this kind, are five on each ſide. In this tribe we may place the Torpedo, the Skate, the Sharp-noſed Ray, the Rough Ray, the Thornback, and the Fire Flare.

The third diviſion is that of the ſlender ſnake-ſhaped kind; ſuch as the Lamprey, the Pride, and the Pipe Fiſh.

The fourth diviſion is of the Sturgeon and its variety, the Iſing-glaſs Fiſh.

The laſt diviſion may compriſe fiſh of different figures and natures, that do not rank under the former diviſions. Theſe are the Sun Fiſh, the Tetrodon, the Lump Fiſh, the Sea Snail, the Chimera, and the Fiſhing Frog.

THE SHARK KIND,

OF all the inhabitants of the deep, the fierceſt and the moſt voracious. The ſmalleſt of this tribe is dreaded even by great fiſh: but the Great White Shark, which is the largeſt, joins to the moſt amazing rapidity, the ſtrongeſt appetites for miſchief: he approaches nearly in ſize to the Whale, far ſurpaſſes him in ſtrength and celerity, in the formidable arrangement of his teeth, and his inſatiable voracity.

Is

Is found from twenty to thirty feet long; ſome aſſert, to four thouſand pound weight; and we are told of one, that had a human corpſe entire in his belly. The head is large, ſomewhat flatted; ſnout long; eyes large: mouth enormouſly wide; the throat capable of ſwallowing a man with eaſe. Has ſometimes ſix rows of teeth, extremely hard, ſharp-pointed, and triangular, and finely ſerrated: ſome ſay ſeventy-two in each jaw, making one hundred and forty-four in all; others think that, as the animal grows older, they increaſe. With theſe both the jaws appear planted: the animal can erect or depreſs them at pleaſure. When the ſhark is at reſt, they lie flat in his mouth; but when he prepares to ſeize his prey, he erects them, by a ſet of muſcles that join them to the jaw. His fins are large; his great goggle eyes he turns with eaſe on every ſide, to ſee his prey behind as well as before: his ſkin is rough, hard, and prickly. His colour light aſh. Providentially the upper jaw projects ſo far above the lower, that he is obliged to turn on one ſide (not quite on his back, as is generally ſuppoſed) to ſeize his prey: As this takes ſome ſmall time to perform, the animal purſued ſeizes that opportunity of eſcaping. It breathes with gills and lungs; its bones are griſtly; and it is viviparous: Belon aſſures us, he once ſaw a female produce eleven young.

No fiſh can ſwim ſo faſt; none is ſo conſtantly employed in ſwimming; he outſtrips the ſwifteſt ſhips, plays round them, darts out before them, and returns, ſeeming to gaze at the paſſengers, without any apparent effort. The dread of ſailors in all hot climates; where he attends the ſhips, in expectation of what may drop over-board. A man who unfortunately falls into the ſea at ſuch a time, is ſure to periſh; for, when once it has taſted human fleſh, it never deſiſts from haunting thoſe places where it expects ſuch prey.

The uſual method of our ſailors to take him, is by baiting a great hook with a piece of beef or pork, which is thrown out into the ſea by a ſtrong cord, ſtrengthened near the hook with an iron chain. Without this precaution, the ſhark would quickly bite the cord in two, and thus ſet himſelf free. It is no unpleaſant amuſement to obſerve this voracious animal coming up to ſurvey the bait, particularly when not preſſed by hunger. He approaches it, examines it, ſwims round it, ſeems for a time to neglect it, perhaps apprehenſive of the cord and the chain; he quits it for a little; but his appetite preſſing, he returns again; appears preparing to devour it, but quits it once more. When the ſailors have ſufficiently diverted themſelves with his evolutions, they make a pretence,

by drawing the rope, as if intending to take it away: then his hunger excites him; he darts at the bait, and ſwallows it, hook and all. Sometimes, however, he does not ſo entirely gorge the whole, but that he once more gets free; yet even then, though wounded and bleeding with the hook, he will again purſue the bait until he is taken. When he finds the hook lodged in his maw, his utmoſt efforts are excited, but in vain, to get free: he tries with his teeth to cut the chain; he pulls with all his force to break the line; he almoſt ſeems to turn his ſtomach inſide out to diſgorge the hook; in this manner he continues his formidable, though fruitleſs efforts; till quite ſpent, he ſuffers his head to be drawn above water, and the ſailors, confining his tail by a nooze, in this manner draw him on ſhip board, and diſpatch him. This is done by beating him on the head till he dies; yet even that is not effected without difficulty and danger; the enormous creature, terrible even in the agonies of death, ſtill ſtruggles with his deſtroyers; nor is there an animal in the world that is harder to be killed. Even when cut in pieces, the muſcles ſtill preſerve their motion, and vibrate for ſome minutes after being ſeparated from the body. Inſtantly as he is taken up, to prevent his flouncing, they cut off the tail with an axe.

Some of the negroes on the African coaſt, take a bolder and more dangerous method to combat their terrible enemy. Armed with only a knife, the negro plunges into the water, where he ſees the Shark watching, and ſwims forward to meet him; though the great animal does not come to provoke the combat, he does not avoid it, and ſuffers the man to approach him; but juſt as he turns upon his ſide to ſeize the aggreſſor, the negro watches the opportunity, plunges his knife in the fiſh's belly, and purſues his blows with ſuch ſucceſs that he lays the ravenous tyrant dead: he ſoon however returns, fixes the fiſh's head in a nooze, and drags him to ſhore, where he makes a noble feaſt for the adjacent villages.

The fleſh is hardly digeſtible by any but the negroes, who are fond of it; the liver affords three or four quarts of oil; ſome imaginary virtues have been aſcribed to the brain; and its ſkin is, by great labour, poliſhed into that ſubſtance called ſhagreen. Mr. Pennant is of opinion, that the female is larger than the male in all this tribe; which would, if confirmed by experience, make a ſtriking agreement between them and birds of prey.

There are many kinds: as the Blue Shark; Angel Shark, which approaches in form to a Ray; Baſking Shark which is fond of warm and ſunny waters, and is ſaid not to be voracious, but to feed on plants, &c.; the Long-tailed Shark, or Sea Fox; the Spotted Shark; and many others.

Among the moſt remarkable by its form, is the *Hammer-headed* Shark; whoſe head extends ſideways into two great flaps, at the extremities of which are the eyes, large, round, and projecting; its mouth under its head; its teeth ſtrong, ſharp, and three or four rows; breathing holes on the ſides. By this peculiarity of head, it is diſtinguiſhed from all other fiſh.

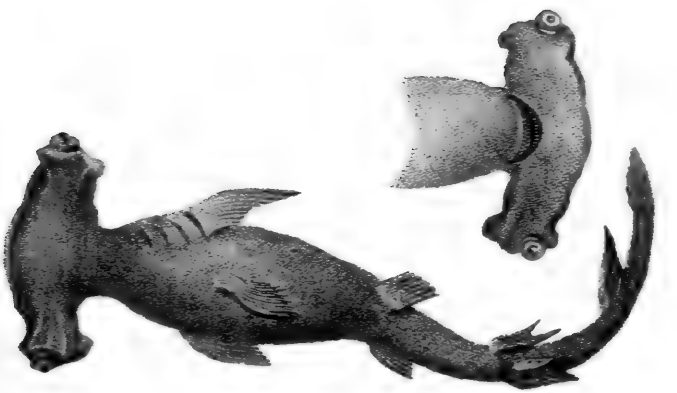
The Remora, or Sucking Fiſh, is ſaid to follow the Shark every where. This fiſh has a power of adhering to whatever it ſticks againſt, as a cupping-glaſs ſticks to the human body. Thus this animal ſticks to the Shark, and drains away its moiſture.

THE RAY KIND.

ALL fiſh of the Ray kind are broad, cartilaginous, ſwimming flat on the water, and having ſpines on their body, or tail. Their eyes and mouth are placed quite under the body, with apertures for breathing either about or near them. All have teeth, or a rough bone which anſwers the ſame purpoſe. Their bowels are very wide towards the mouth; diminiſhing to the tail. The tail is narrow, ending either in a bunch or a point. But they are chiefly diſtinguiſhed by their ſpines or prickles, on different parts of their body. Some have ſpines above and below; others on the upper part only; ſome at the tail; ſome have three rows, others but one: in ſome they are comparatively ſoft and feeble; in others, ſtrong and piercing. The ſmalleſt of theſe ſpines uſually incline toward the tail, the larger toward the head.

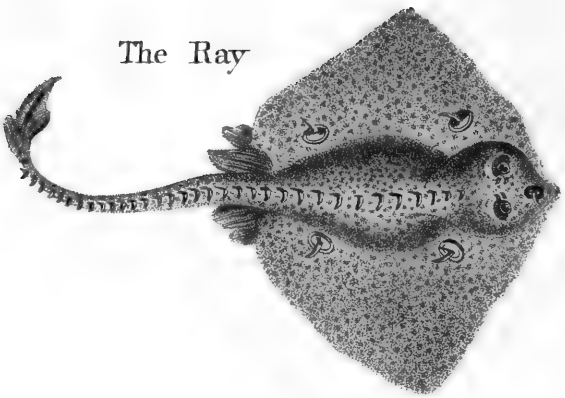
The SKATE has the middle of the back rough, and a ſingle row of ſpines on the tail, on the edges a few others. The *Sharp-noſed Ray* has ten ſpines ſituated toward the middle of the back. The *Rough Ray* has ſpines over the whole back. The *Thornback* has three rows on the back, and more on the tail. The *Fire-flare* has but one ſpine, but that a dangerous weapon, placed on the tail, about four inches from the body, five inches long; of a flinty hardneſs, the ſides thin, ſharp-pointed, cloſely and ſharply bearded its whole length. The *Torpedo* has no ſpines that wound; but is poſſeſſed of one of the moſt potent and extraordinary faculties in nature, viz. that of electrifying whatever it touches.

Of the larger fiſh theſe are the moſt numerous. Except the white ſhark and cachalot no fiſh can ſwallow them, and their ſpines make them dangerous; the ſize of ſome is ſuch, that even the ſhark himſelf is unable to devour

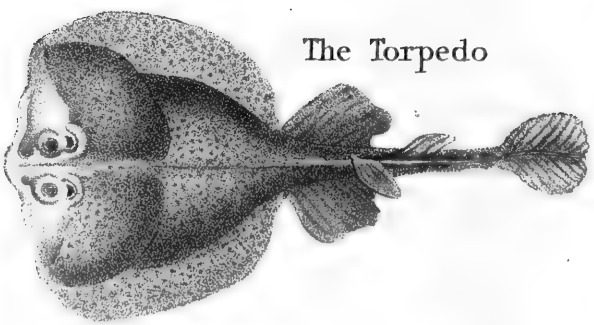


Hammer-headed Shark.

The Ray



The Torpedo



devour them: ſome have been ſeen in England weighing two hundred pounds; but that is nothing to their enormous bulk in other parts of the world. Labat tells us of a prodigious Ray ſpeared by the negroes at Gaudaloupe, thirteen feet eight inches broad, ten feet from the ſnout to the inſertion of the tail. The tail itſelf fifteen feet long; twenty inches broad at its inſertion, and tapering to a point. The body two feet in depth; the ſkin as thick as leather, and ſpotted; which ſpots, in all of this kind, are only glands, that ſupply a mucus to lubricate and ſoften the ſkin. This enormous fiſh was utterly unfit to be eaten by the Europeans; but the negroes choſe out ſome of the niceſt bits, and carefully ſalted them up as a moſt favourite proviſion. Ulloa gives the ſame account of a fiſh in the South Seas, called the *Manta* or Quilt, from its wrapping the divers to death in its fins; for fear of which they always carry a knife with them when they go down. Yet, large as this may ſeem, it is probable that, as the largeſt generally keep at the bottom, they are ſeldom or never ſeen. It is generally ſuppoſed that of this kind are the largeſt inhabitants of the deep.

The Ray generally chuſes a black muddy bottom; the large ones keep at great depths; the ſmaller approach the ſhores, and feed on whatever they can meet with. As they are ravenous, they eaſily take the bait, yet will not touch it if it be taken up and kept a day or two out of water. Generate in March and April; at which time only they are ſeen ſwimming near the ſurface. They adhere faſt together: the females are very prolific, three hundred eggs having been taken out of the body of a ſingle Ray. Theſe are covered with a tough horny ſubſtance, which they acquire in the womb. When come to proper maturity, they are excluded, but never above one or two at a time, and often at intervals of three or four hours; they begin in May. In October, when they ceaſe, they are exceedingly thin; in November they begin to improve, and grow gradually better till May, when they are in the higheſt perfection.

The Skate and the Thornback are very good food; and their ſize, which is from ten pounds to two hundred weight, very well rewards the trouble of fiſhing for them. But it ſometimes happens that the lines are viſited by very unwelcome intruders; by the rough ray, the fireflare, or the torpedo. To theſe the fiſhermen have moſt mortal antipathy; and ſhudder at the ſight; for they ſometimes feel the reſentments of this angry tribe; and, inſtead of a prize, find they have caught an enemy.

The Rough ray inflicts but ſlight wounds with its prickles. The ignorant would at firſt ſight take it in his hand, without apprehenſion;

but he ſoon finds that there is no part of its body without ſpines; and no way of ſeizing the animal, but by the little fin at the end of the tail.

The Fireflare is dreaded by the boldeſt and moſt experienced fiſhermen; inflicting a terrible wound, attended with dangerous ſymptoms; but it cannot be poiſonous, as the ſpine has no ſheath to preſerve the ſuppoſed venom on its ſurface; nor has the animal a gland to ſeparate the noxious fluid; the ſpine is fixed to the tail, as a quill to the tail of a fowl, and is annually ſhed in the ſame manner.

The body of the Torpedo is almoſt circular, and thicker than others of the ray kind; the ſkin is ſoft, ſmooth, yellowiſh, marked, as all the kind, with large annular ſpots; the eyes very ſmall; the tail tapering to a point; weighs from ſeven to fifteen pounds. Redi found one of twenty-four pounds.

The ſhock of this fiſh proceeds from an animal electricity, which it has a power of ſtoring up, and diſcharging. The ſhocks, and duration of the pain, are like the electric: but how the animal contrives to renew the charge, how it is prevented from evaporating it on contiguous objects, how it is originally procured, are difficulties. As its ſtrength ceaſes, the force of its ſhock diminiſhes, and when dead is deſtroyed; it may be handled or eaten with perfect ſecurity: when immediately taken out of the ſea, its force is very great, and not only affects the hand, but, if even touched with a ſtick, the perſon finds himſelf ſometimes affected. It appears that the Torpedo has an apparatus under the ſkin, entirely for this purpoſe; which, like the electric battery, is an aſſemblage of ſtrength, formed from various ſmaller powers: theſe, diſcharged at once, give an exceeding ſmart ſhock: while earth and water, as well as air, are replete with the electric fluid, we may conſider them as furniſhing thoſe ſtores which this creature, by its extraordinary qualities, has the power of *conducting*. The uſes of this power ſeem to be, *firſt*, the numbing its enemies when they attempt to ſeize it; *ſecondly*, numbing its prey, as it paſſes over. It is frequent in Torbay. Brings forth its young in September. Seems to be capable of ſuperfœtation. The Crab and Sea-Leech annoy them. Some weigh eighty pounds. Godignus, in his Hiſtory of Abyſſinia, carries this quality to a moſt ridiculous exceſs: he tells us of one of theſe that was put into a baſket among a number of dead fiſhes and that the next morning the people, to their utter aſtoniſhment, perceived that the Torpedo had actually *numbed* the dead fiſhes *into life again*.

There are other fiſh poſſeſſed of this numbing quality, which has acquired them the name of the Torpedo. Theſe are deſcribed by Atkins and Moore, as found in great abundance along the coaſt of Africa. They

are

are ſhaped like a mackarel, except that the head is much larger; the effects of theſe ſeem alſo to differ in ſome reſpects. Condamine alſo informs us of a fiſh poſſeſſing theſe powers, reſembling the Lamprey (the *Gymnotus Electricus*). This, if touched by the hand, or with a ſtick, inſtantly benumbs the hand and arm to the very ſhoulder; and ſometimes the man falls down under the blow. Inhabits America.

THE LAMPREY.

THE Lamprey is eſteemed according to the ſeaſon, or the place where it has fed. Thoſe that leave the ſea to depoſit their ſpawn in freſh waters, are the beſt; thoſe entirely bred in our rivers, are much inferior. In March, April, or May, juſt after leaving the ſea, they are very good; thoſe caught after they have caſt their ſpawn, are flabby and of little value. Thoſe caught in ſeveral of the rivers in Ireland, the people will not venture to touch; thoſe of the Engliſh Severn are conſidered as the moſt delicate of fiſh.

The Lamprey reſembles an eel in general appearance, but is of a lighter colour, and clumſier make. Its mouth is round, placed rather obliquely below the end of the noſe, more reſembling the mouth of a leech than of an eel: on the top of the head a hole through which it ſpouts water, as in the cetaceous kind; ſeven holes on each ſide for reſpiration; the fins are formed rather by a lengthening out the ſkin, than by a ſet of bones or ſpines for that purpoſe. The mouth has a property of ſticking cloſe to, and ſucking, any body it is applied to. We are told of one that weighed but three pounds; yet ſtuck ſo firmly to a ſtone of twelve pounds, that it remained ſuſpended at its mouth, from which it was ſeparated with no ſmall difficulty. This power of ſuction is ſuppoſed to ariſe from the animal's exhauſting the air within its body by the hole over the noſe, while the mouth is cloſely fixed to the object, and permits no air to enter; has twenty rows of ſmall teeth in its mouth. Its adheſive quality may be in ſome meaſure increaſed by that ſlimy ſubſtance with which its body is all over ſmeared.

From ſome peculiarity of formation, this animal ſwims generally with its body as near as poſſible to the ſurface; and it might eaſily be drowned by

by being kept by force for any time under water; it ſeems to have but one great bowel, running from the mouth to the vent, narrow at both ends, and wide in the middle. The Lamprey's food is either ſlime and water, or ſuch ſmall water-inſects as are ſcarce perceivable. Perhaps its appetite may be more active at ſea, of which it is properly a native.

It quits the ſea in the beginning of ſpring, in order to ſpawn, and after a ſtay of a few months it returns again to the ſea. Their preparation for ſpawning is by making holes in the gravelly bottom of rivers; and on this occaſion their ſucking power is particularly ſerviceable; for if they meet with a ſtone of a conſiderable ſize, they will remove it, and throw it out. Their young are produced from eggs; the female remains near the place where they are excluded, and continues with them till they come forth. She is ſometimes ſeen with her whole family playing about her; and after ſome time ſhe conducts them in triumph to the ocean. But ſome have not ſufficient ſtrength to return; and theſe continue in the freſh water till they die. This fiſh, according to Rondeletius, is very ſhort-lived, and two years is generally the limit of its exiſtence.

They are uſually taken in nets with ſalmon, and ſometimes in baſkets at the bottom of the river. It has been an old cuſtom for the city of Glouceſter annually to preſent the king with a lamprey-pie; and as the gift is made at Chriſtmas, it is not without great difficulty the corporation can procure the proper quantity, though they give a guinea apiece for taking them. There are two or three ſizes, rather than ſorts; that called the Pride of the Iſis, is not peculiar to that river,

THE STURGEON.

THE Sturgeon in its general form reſembles a freſh-water pike. The noſe is long; the mouth is ſituated beneath, ſmall, and without jaw-bones; always open in the dead fiſh. The body is long, pentagonal, flat below, and covered with five rows of large bony knobs, one row on the back, and two on each ſide; on the back a ſingle fin near the tail, which is bifurcated. Five other fins below.

Of this fiſh there are three kinds; the Common Sturgeon, the Caviar Sturgeon, and the Huſo or Iſinglaſs Fiſh. The firſt has eleven knobs or

ſcales on the back; the ſecond fifteen; the latter thirteen on the back and forty-three on the tail. The firſt is the Sturgeon, the fleſh of which is ſent pickled into all parts of Europe. The ſecond is the fiſh from the roe of which that noted delicacy called caviar is made: and the third, beſides ſupplying the caviar, furniſhes alſo the valuable commodity of iſinglaſs. They all grow to a very great ſize; and ſome of them have been found above eighteen feet long.

There is not a country in Europe but what this fiſh viſits at different ſeaſons; it annually aſcends the largeſt rivers to *ſpawn*, and propagates in amazing numbers. The inhabitants along the banks of the Po, the Danube, and the Wolga, make great profit of its incurſions up the ſtream, and have their nets prepared for its reception. The ſturgeon alſo is brought daily to the markets of Rome and Venice, and abounds in the Mediterranean; thoſe that keep entirely either in ſalt or freſh water are comparatively ſmall. When the ſturgeon enjoys the viciſſitude of freſh and ſalt water, it grows to an enormous ſize. It is often accidentally taken in our rivers in ſalmon-nets: a fiſh taken in the Eſke weighed four hundred and ſixty pounds. North-America alſo furniſhes the ſturgeon; their rivers, in May, June, and July, ſupply them in very great abundance. At that time they are ſeen ſporting in the water, and leaping from its ſurface ſeveral yards into the air. When they fall again on their ſides, the concuſſion is ſo violent, that the noiſe is heard in ſtill weather at ſome miles diſtance.

It is never caught by a bait in the ordinary manner of fiſhing, but always in nets; it never attempts to ſeize any of the finny tribe, but lives by rooting at the bottom of the ſea for inſects and ſea-plants. Nothing is found in its ſtomach but a kind of ſlimy ſubſtance, which has induced ſome to think it lives only upon water and air. From hence there is a German proverb, which is applied to a man extremely temperate, when they ſay he is as moderate as a ſturgeon.

The ſmalleſt fiſh is alone ſufficient to terrify a ſhoal of ſturgeons; for, being unfurniſhed with any weapon of defence, they are obliged to truſt to ſwiftneſs and caution for ſecurity. Sturgeons live in ſociety among themſelves; Geſner aſſerts, that he has ſeen them ſhoal together, at the notes of a trumpet.

The nets in which the ſturgeon is caught are made of ſmall cord, and placed acroſs the mouth of the river; but in ſuch a manner that, whether the tide ebbs or flows, the pouch of the net goes with the ſtream. The ſturgeon thus caught, while in the water, is one of the ſtrongeſt fiſhes that

ſwims, and often breaks the net to pieces that encloſes it; but the inſtant it is raiſed with its head above water, all its activity ceaſes: it is then a lifeleſs, ſpiritleſs lump, and ſuffers itſelf to be tamely dragged on ſhore; yet it has been found to break a fiſherman's leg with a blow of its tail.

Caviar is made from the roe of all kinds of ſturgeon, but particularly the ſecond. It is a conſiderable merchandize among the Turks, Greeks, and Venetians. Caviar ſomewhat reſembles ſoft ſoap in conſiſtence; but it is of a brown, uniform colour, and is eaten as cheeſe with bread. It is made of the ſpawn from the body of the ſturgeon; for the ſturgeon differs from other cartilaginous fiſh, having ſpawn like a cod, not eggs like a ray.

The Huſo, or Iſinglaſs Fiſh, is caught in great quantities in the Danube, from the months of October to January: ſeldom under fifty pounds weight, often above four hundred: its fleſh is ſoft, glutinous and flabby; but it is ſometimes ſalted, which makes it better taſted, and then it turns red like ſalmon. It is for the commodity it furniſhes that it is chiefly taken. Iſinglaſs is of a whitiſh ſubſtance, inclining to yellow, done up into rolls, made of the ſkin, the entrails, the fins and the tail of this fiſh, cut into ſmall pieces, macerated and boiled to a jelly; which hardens when dry.

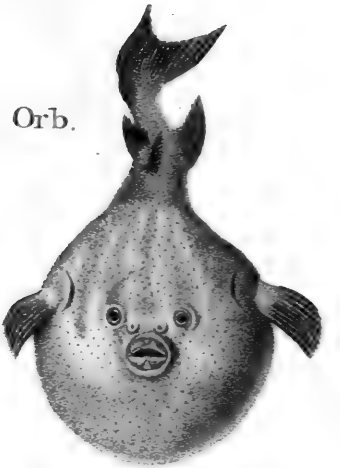
OF ANOMALOUS CARTILAGINOUS FISHES.

IN this claſs we have the Pipe Fiſh, that almoſt tapers to a thread; the Mole, or Sun Fiſh, that has the appearance of a bulky head, but the body cut off in the middle; the Hippocampus, with an head ſomewhat like that of an horſe; and the Water Bat, whoſe head can ſcarcely be diſtinguiſhed from the body; the Fiſhing Frog, from its deformity, called the Sea Devil, the Chimæra, the Lump Fiſh, the Sea Porcupine, and the Sea Snail. Of theſe the hiſtory is but little known.

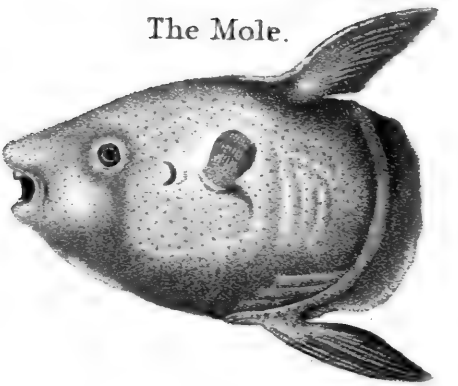
The Mole, or Sun Fiſh, ſometimes grows very large; one taken near Plymouth was five hundred weight. In form it reſembles a bream, or ſome deep fiſh cut off in the middle: the mouth is very ſmall, and contains in each jaw two broad teeth, with ſharp edges: the colour of the back is duſky and dappled, the belly a ſilvery white. When boiled, it has been obſerved to turn to a glutinous jelly, and would moſt probably

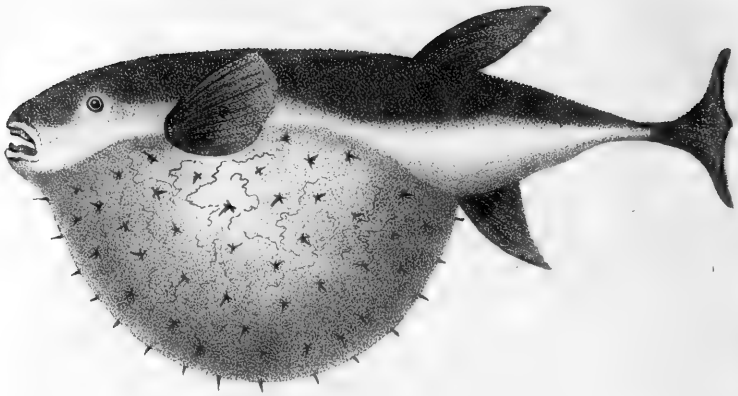
ſerve

The Orb.



The Mole.





The Globe Mole, *or* Diodon

ſerve for all the purpoſes of iſinglaſs, were it found in ſufficient plenty. Of this there is a ſhorter and a longer. The Globe Mole, or Diodon, is remarkable for the power of inflating its belly, which is uſually oblong, to a very great ſize and globular ſhape, thereby erecting the ſpines with which that part is covered ſo as to render it leſs ſeizable, and more terrific to fiſh of prey. Circumference of one in this condition, two feet ſix, length of the belly one foot, whole length one foot ſeven inches, belly and ſides white, wrinkled. Common to Europe and Carolina.

The Fiſhing Frog in ſhape generally reſembles a tadpole; but it grows to above five feet long, and its mouth is ſometimes a yard wide. The head is much bigger than the body; the under jaw projects before the upper; both are armed with rows of ſlender, ſharp teeth: the palate and tongue have alſo teeth; the eyes are on the top of the head, encompaſſed with prickles: immediately above the noſe are two long beards or filaments, ſmall in the beginning, but thicker at the end, and round. There is another ſpecies that has no beards. Rondeletius informs us, that, when embowelled, the body has a kind of tranſparence; and, if a lighted candle be placed within it, as in a lanthorn, has a very formidable appearance. It is an enemy to the dog-fiſh, the bodies of thoſe fierce and voracious animals being often found in its ſtomach.

The Lump Fiſh is in length ſixteen or twenty inches, weighs about four pounds; ſhape deep; it ſwims edgeways; the back is ſharp and elevated, and the belly flat; the lips, mouth and tongue a deep red; the whole ſkin is rough, with bony knobs; the largeſt row is along the ridge of the back; the belly a bright crimſon: but what makes the chief ſingularity in this fiſh, is an oval aperture in the belly, ſurrounded with a fleſhy ſoft ſubſtance, that ſeems bearded all round; by means of this part, it adheres with vaſt force to any thing it pleaſes. If flung into a pail of water, it will ſtick ſo cloſe to the bottom, that, on taking the fiſh by the tail, one may lift up pail and all, though it hold ſeveral gallons of water.

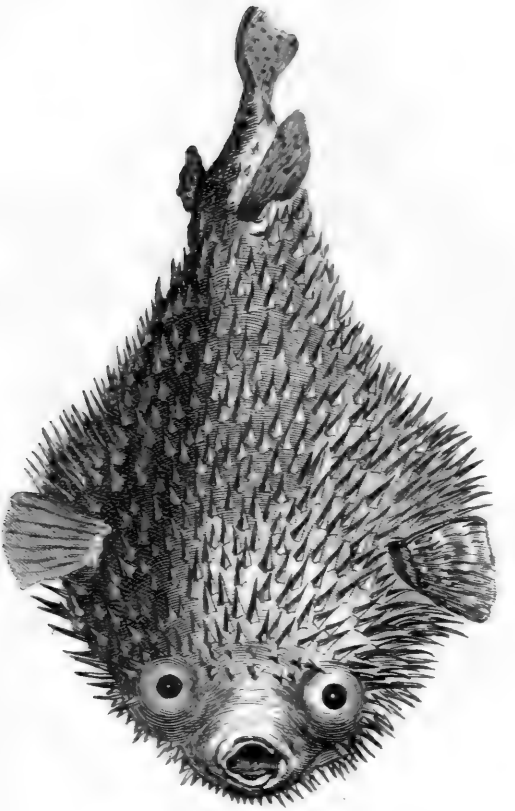
The Sea Snail takes its name from the ſoft and unctuous texture of its body, reſembling a land ſnail. It is almoſt tranſparent, and ſoon diſſolves and melts away. It is five inches long; colour, when freſh taken, pale brown; ſhape round, but flatted near the tail; the back-fin reaches all the way from the head to the tail. Beneath the throat is a round depreſſion, of a whitiſh colour, ſurrounded by twelve brown riſings, placed in a circle, by which it is thought to be alſo a ſucker. It is taken in England, at the mouths of rivers, four or five miles diſtant from the ſea. There are other ſuckers of much ſmaller dimenſions.

The Pipe Fiſh, in the thickeſt part, is not thicker than a ſwan-quill, yet is above ſixteen inches long: hexangular in part, the tail quadrangular. General colour olive brown, marked with numbers of blueiſh lines, pointing from the back to the belly. Is viviparous; for, on cruſhing one that was juſt taken, hundreds of very minute young ones were obſerved to crawl about. There are others leſs, and not viviparous.

The Hippocampus, which, from the form of its head, ſome call the Sea Horſe, never exceeds nine inches in length. It is about as thick as a man's thumb; and the body is ſaid, while alive, to have hair on the fore part, which falls off when it is dead. The ſnout is a ſort of tube, with a hole at the bottom, to which there is a cover, which the animal can open and ſhut at pleaſure. Behind the eyes are two fins, which look like ears; and above them are two holes, which ſerve for reſpiration. The whole body ſeems to be compoſed of cartilaginous rings, on the intermediate membranes of which ſeveral ſmall prickles are placed. It is found in the Mediterranean, and alſo in the Weſtern Ocean; and, upon the whole, more reſembles a great caterpillar than a fiſh. The ancients conſidered it as extremely venomous.

Among foreign animals of this kind, chiefly Indian and American, we may place the Sea Orb, which is almoſt round, has a mouth like a frog, and is from ſeven inches to two feet long. Like the porcupine, from whence it ſometimes takes its name, being alſo called the Sea Porcupine, covered over with long thorns or prickles, which point on every ſide; and, when the animal is enraged, it can blow up its body as round as a bladder. Of this extraordinary creature there are many kinds; ſome threatening only with ſpines, as the Sea Hedge-hog; others defended with a bony helmet that covers the head, as the Oſtracion; others with a coat of mail from the head to the tail, where it terminates in a point, as the Centriſcus; and others ſtill armed offenſively and defenſively with bones and ſpines, as the Shield Orb. Of theſe ſcarce one is without its peculiar weapon of offence. The centriſcus wounds with its ſpine; the oſtracion poiſons with its venom; the orb is impregnable, and is abſolutely poiſonous, if eaten.

They are of different ſizes; ſome not bigger than a foot-ball, and others as large as a buſhel. They almoſt all flatten and erect their ſpines at pleaſure, and increaſe the terrors of their appearance in proportion to the approach of danger. At firſt they ſeem inoffenſive; their body oblong, with all their weapons pointing towards the tail; but upon



The Sea Hedghog.

being provoked or alarmed, the body that before ſeemed ſmall ſwells rounder and larger, all its prickles ſtand upright, and threaten the invader on every ſide. In the middle of the belly is a ſort of bag or bladder filled with air, by inflation of which the animal ſwells itſelf.

The Galley (which Linnæus degrades among inſects, under the title Meduſa), to the eye of an unmindful ſpectator, ſeems a tranſparent bubble ſwimming on the ſea, variouſly and beautifully painted with vivid colours, where red and violet predominate, as differently oppoſed to the ſun's rays. It is however a fiſh; its body compoſed of cartilages, and a very thin ſkin filled with air, which keeps it floating. Sometimes it is thrown aſhore by one wave, and waſhed back by another. Perſons walking along the ſhore often tread on theſe animals; and the burſting of their body has a report like that of the air bladder of a fiſh. It has eight broad feet; it faſtens itſelf to whatever it meets by its legs, which have an adheſive quality. Whether they move when on ſhore Labat could never perceive, though he did every thing to make them ſtir; he only ſaw that it ſtrongly adhered to whatever ſubſtances he applied it. It is common in America, the ſize of a gooſe-egg, or ſomewhat more. Perpetually floats, and no efforts can ſink it. Beneath, in the water, are four feet ſerving as oars, the other four are expanded above to ſail with. But what is remarkable is the violent pungency of the ſlimy ſubſtance with which its legs are ſmeared. If the ſmalleſt quantity but touch the ſkin, it burns it like hot oil dropped on the part. The pain is worſt in the heat of the day, but ceaſes in the cool of the evening. From feeding on theſe he thinks the poiſonous quality of ſome Weſt-Indian fiſh may be accounted for. They are extremely common along all the coaſts in the Gulf of Mexico; and whenever the ſhore is covered with them in an unuſual manner, it is conſidered as a certain forerunner of a ſtorm.

OF SPINOUS FISHES.

THESE are diſtinguiſhed by having a complete bony covering to their gills; by breathing with gills only; by their bones being ſharp and thorny; and their tails being placed perpendicular to the body. The foregoing claſſes bear no proportion to them in number.

Of

Of the real hiſtory of theſe fiſhes, very little is known; our information relates only to their external form.

Fiſh that have bony prickly fins, are called Prickly-finned Fiſh; thoſe that have ſoft or cartilaginous fins, are called Soft-finned Fiſh. Spinous fiſh therefore are formed into theſe two diviſions.

Linnæus has alſo arranged them by remarking the ſituation of their fins: the ventral or belly fins (which are thoſe particularly to be remarked) are (1) either wholly *wanting*, as in the eel; then the fiſh is called *Apodal* (a Greek word ſignifying without feet); or (2) the ventral fins are placed *forwarder* than the pectoral fins, as in the haddock; then the animal is called a *Jugular* fiſh; or (3) the ventral fins are placed *directly under* the pectoral fins, as in the father-laſher; then it is called a *Thoracic* fiſh; or (4) the ventral fins are placed *nearer the tail* than the pectoral fins, as in the minow; then it is an *Abdominal* fiſh.

Prickly-finned fiſh making one general diviſion, and the ſoft-finned fiſh another, there are prickly-finned *apodal* fiſhes, prickly finned *jugular* fiſhes, prickly-finned *thoracic* fiſhes, and prickly-finned *abdominal* fiſhes: alſo, on the other hand, there are ſoft-finned *apodal* fiſhes, ſoft-finned *jugular* fiſhes, ſoft-finned *thoracic* fiſhes, and ſoft-finned *abdominal* fiſhes.

OF SPINOUS FISHES IN GENERAL.

THE hiſtory of any one of this claſs very much reſembles that of the reſt: they breathe air and water through the gills; they live by rapine, each devouring ſuch animals as it can ſwallow; and they propagate, not by bringing forth their young alive, as in the cetaceous tribe; nor by diſtinct eggs, as in the generality of the cartilaginous tribe; but by ſpawn, which contains hundreds of thouſands. Their bones when ſlightly inſpected appear entirely ſolid; yet, viewed cloſely, are hollow, filled with a ſubſtance leſs rancid and oily than marrow. They are very numerous, and pointed. The ſkeleton of a fiſh has its members very regularly diſpoſed; and every bone its fixed place, with perfect preciſion. Their number of bones is according to their number of fins; and the number in each fin is in proportion to the number and ſize of the fins: for every fiſh has a regular apparatus of bones and muſcles, by which the

fins

fins are moved; thoſe fiſh which are large, fat, and have few fins, are the leaſt bony: thoſe which are ſmall, lean, and have many fins, are the moſt bony.

Spinous fiſh can live out of their own element but a very ſhort time. In general, when taken out of the water, they pant violently and at cloſe intervals, the thin air not maintaining their gills in proper play; and in a few minutes they expire. But ſome are more vivacious than others; the eel lives ſeveral hours out of water; and the carp has been fattened in a damp cellar; being placed in a net well wrapped up in wet moſs, the mouth only out, and hung up in a vault; fed with white bread and milk; and the net now and then plunged into the water. Thus managed, it has been known not only to live a fortnight, but to grow exceeding fat, and of ſuperior flavour. To ſome fiſhes, bred in the ſea, freſh water is immediate deſtruction: on the other hand, ſome fiſhes, that live in our lakes and ponds, cannot bear ſalt water. Probably this ariſes from the ſuperior weight of the ſea water, and its greater force on the organs of reſpiration; ſo that fiſh uſed only to freſh water, cannot bear the weight of the marine fluid. No fiſhes imbibe any of the ſea's ſaltneſs with their food, or in reſpiration. The fleſh of all fiſhes is equally freſh, both in the river, and at the ſalteſt depths of the ocean; yet there are ſome whoſe organs are equally adapted to either element: the ſalmon, the ſhad, the ſmelt, and the flounder, annually quit their native ocean, and come up our rivers to depoſite their ſpawn. There is no danger they will not encounter, even to the ſurmounting precipices, to find a proper place for depoſiting their future offſpring. The SALMON aſcend rivers five hundred miles from the ſea; braving not only the danger of enemies, but alſo the aſcent of cataracts as high as a houſe. When they come to the bottom of ſuch a torrent, they ſeem diſappointed at the obſtruction, and ſwim ſome paces back: then view the danger before them, ſurvey it motionleſs for ſome minutes, advance, and again retreat; at laſt ſummoning all their force, they leap from below, their body ſtraight, and ſtrongly in motion; and thus moſt frequently clear every obſtruction. But ſometimes they want ſtrength to make the leap; and then, in our fiſheries, they are taken in their deſcent, alſo by the hook, by nets, baſkets, &c. Their capture makes, in ſeveral countries, a great article of commerce; being cured in ſeveral different manners, by ſalting, pickling, or drying.

Others, particularly the EEL, deſcend from freſh water, as Redi aſſures us, to bring forth in the ſea. About Auguſt, annually, in the moſt obſcure nights, and when the rivers are flooded by rains, they ſeek the ocean.

Having reached the ſea, and produced their young (for theſe are viviparous), they again aſcend, as opportunity offers, from January to May, when they are taken in the river Arno by millions, and ſo ſmall that a thouſand of them goes to a pound. It is certain they deſcend in our own rivers after floods, in abundance, and are caught in nets, to great advantage. They poſſeſs alſo a power of climbing over obſtacles; for, by applying their glutinous and ſlimy bodies, they can creep up locks, weirs, and every thing that would prevent their aſcending the ſtream.

There are fiſh that take a courſe of three or four thouſand miles in a ſeaſon; yet preyed on by whales, ſharks, and water-fowl, that regularly wait their progreſs. Theſe fiſh of paſſage bear ſtrong analogy to birds of paſſage, both from their ſocial diſpoſition, and their immenſe numbers. Such are the cod, the haddock, the whiting, the mackarel, the tunny, the herring, and the pilchard. Other fiſh live in our vicinity, and reſide on our coaſts; or keep in the depths of ocean, ſeldom ſeen: but theſe, at ſtated ſeaſons, viſit their accuſtomed haunts with regular certainty, generally returning the ſame week in the ſucceeding year, and often the ſame day.

This is one of the moſt extraordinary circumſtances in the hiſtory of nature. What impels them to ſuch voyages; what directs their paſſage; what ſupports them by the way; and what ſometimes prompts them to quit, for ſeveral ſeaſons, one ſhore for another, and then return to their accuſtomed harbour; are queſtions philoſophy can hardly reſolve.

The COD ſeems foremoſt of this wandering tribe; is only found in our northern part of the world. Its chief reſort is on the banks of Newfoundland, and the other ſand-banks off Cape-Breton. That extenſive flat ſeems to be the broad top of a ſea-mountain, extending above five hundred miles, and ſurrounded with a deeper ſea. Hither the cod annually repair in numbers beyond calculation, to feed on the worms found in that ſandy bottom. Here they are taken in quantities, to ſupply all Europe. Yet this immenſe capture makes but a very ſmall diminution of their numbers. When their proviſion there is exhauſted, or the ſeaſon for propagation returns, they go off to the polar ſeas, where they depoſit their roes in ſecurity. From thence want of food forces them, as ſoon as the circumjacent ſeas are open, to repair ſouthward.

The HADDOCK, the WHITING, and the MACKAREL, are thought, by ſome, to be driven on our coaſts by the purſuit of larger fiſhes: rather, they ſeek that food which is in greater plenty near the ſhore than out at ſea. Their migrations ſeem remarkably regularly

conducted, even to a day. A ſhoal of haddocks often extends from the ſhore three miles in breadth, and in length forty. Its limits are preciſely known; for if the fiſhermen put down their lines more than three miles from ſhore, they catch nothing but dog-fiſh; a proof the haddock is not there.

HERRINGS and PILCHARDS are in greateſt abundance in the higheſt northern ſeas, covered with ice great part of the year, whither neither man, the fin-fiſh, or the cachalot, dares purſue them. The quantity of inſect food thoſe ſeas ſupply, is very great; ſo that, defended by the rigid climate, they live at eaſe, and multiply beyond expreſſion. Anderſon ſuppoſes they would never depart, but that their numbers render migration neceſſary; and, as bees in a hive, they are compelled to ſeek other retreats.

They quit the icy ſea about the middle of winter, in ſuch numbers, that were all the men in the world loaded with herrings, they would not carry a thouſandth part away: but they barely leave their retreats, ere millions of enemies thin their ſquadrons. The fin-fiſh and the cachalot ſwallow thouſands at a yawn; the porpeſſe, the grampus, the ſhark, the whole tribe of dog-fiſh, find them an eaſy prey: the unnumbered flocks of ſea-fowl that chiefly inhabit near the Pole, watch their outſet, and ſpread extenſive ruin. Thus ſurrounded, they ſeek ſafety by crowding together, leaving to the outmoſt the danger of being firſt devoured, like ſheep when frighted: they ſeparate into ſhoals, one of which moves weſt, along the coaſts of America, as far as Carolina. In Cheſapeak bay, the annual inundation of theſe fiſh is ſo great, that they become a nuiſance. Thoſe that hold to the Eaſt, come down the coaſt of Iceland in the beginning of March; their phalanx, though after conſiderable diminutions, of amazing extent, depth, and cloſeneſs, covering an extent as large as the iſland itſelf. The whole water ſeems alive, and is black with them to a great diſtance. A ſhovel, or hollow veſſel, put into the water, takes them up without farther trouble. That body which viſits our coaſts, appears off the Shetland iſles in April. This is the forerunner of the grand ſhoal in June, whoſe arrival is announced by the number of gannets, gulls, ſharks, and porpeſſes. The main body, of ſuch breadth and depth as to alter the appearance of the ocean, is divided into columns, five or ſix miles long, three or four broad; the water before them curls up as if forced from its bed. Sometimes they ſink for ten or fifteen minutes, then riſe again to the ſurface; and, in bright weather, reflect a variety of ſplendid colours, purple, gold, and azure.

The fiſhermen take ſometimes two thouſand barrels at a ſingle draught of their nets. At the Shetland iſles this great army divides, part to the weſtern coaſts of Ireland, where a ſecond time they divide to the Atlantic Ocean and to the Iriſh Sea. They ſeek thoſe bays and ſhores where they can beſt find food and defence. The quantity that attempts to return is but ſmall; and Anderſon doubts whether they ever return.

Many doubts ariſe on every part of this migration. Though ſuch numbers periſh, yet, in compariſon to thoſe that ſurvive, the account is trifling: it is ſuppoſed that thoſe taken by man, are not one to a million. Their leaving the ſhore at a ſtated time, ſeems not the impulſe of neceſſity; neither is their fixing on ſome ſhores for ages, then capriciouſly forſaking them, never to return. This ſeems to indicate as if food had its ſhare of attraction, and was not always in equal plenty. Before the year 1584, the number of ſhips that reſorted to Norway was ſome thouſands. The quantity of herrings was ſuch, that a man who ſhould put a ſpear in the water, as Olaus Magnus aſſerts, would ſee it ſtand on end. But ſoon after they deſerted theſe ſhores for the German coaſt, where the Hanſe-towns drove a very great trade by their capture and ſale; but, for above a century, they have greatly forſaken them, and preferred the Britiſh Channel and the Iriſh ſhores.

The PILCHARD, which differs little from the herring, makes the coaſt of Cornwall its principal reſort. The natives ſometimes incloſe a bay of ſeveral miles extent with their nets, called ſeines. The ſhoals are perceived by the colour of the water, which aſſumes a tincture from the fiſhes beneath. Sometimes twelve or fifteen hundred barrels are taken at a draught; often the quantity caught exceeds the ſalt or the utenſils for curing them; and then they are carried off for manure.

Whence theſe infinite numbers are derived, remains obſcure; but it is notorious that the STICKLEBACK, of two inches long, that might be thought eaſily ſupported in any water, is obliged to colonize, and leave its native fens. Every ſeventh or eighth year, amazing ſhoals of theſe appear in the river Welland, near Spalding, and come up the ſtream. They are ſuppoſed to be detached from ſome of the fens, overcharged with numbers. A man, employed by a farmer to take them for manure, got for a conſiderable time four ſhillings a day, by ſelling them at a halfpenny per buſhel!

Such is the amazing propagation of fiſhes in our own climate; but this bears no proportion to the vaſt quantities in the Indian ocean, where it is but going down to the ſhore, and fiſh are found in great numbers,

numbers, in plaſhes that continue to have water; and where the quantity is ſo great, that they are left in ſhoals on ſwamps, dried by the ſun, and their putrefaction contributes to render the country unhealthful.

A ſingle herring, multiplying unmoleſted and undiminiſhed for twenty years, would furniſh a progeny greater in bulk than ten times our globe; ſo that the porpeſſe, the ſhark, the cod-fiſh, are benefactors, without whoſe aſſiſtance the ſea would ſoon become overcharged with the burthen of its own productions.

Their ſpawn is depoſited where the ſun-beams may reach it, either at the bottom of ſhallow ſhores, or on the ſurface in deeper waters. A ſmall degree of heat anſwers the purpoſes of incubation, and the animal iſſues from the egg in perfect formation.

Annually, in July, there appear near Greenwich ſhoals of ſmall fiſhes, called by the Londoners White Bait. It is univerſally agreed that they are the young of ſome fiſh: they are never ſeen but at this time, and never have any roe. The quantity is amazing; and the fiſh that produces them in ſuch numbers muſt be in plenty, though it is not yet known what that fiſh is, as they correſpond with no other ſpecies whatever. Some think them the young of ſome animal not yet come to perfect form.

The manner in which the eggs of fiſhes are impregnated, is wholly unknown; but ſuppoſed to be by the male ſhedding his milt on them, when he meets them. Spinous fiſhes produce by ſpawn; yet ſome, as the eel and the blenny, bring forth their young alive.

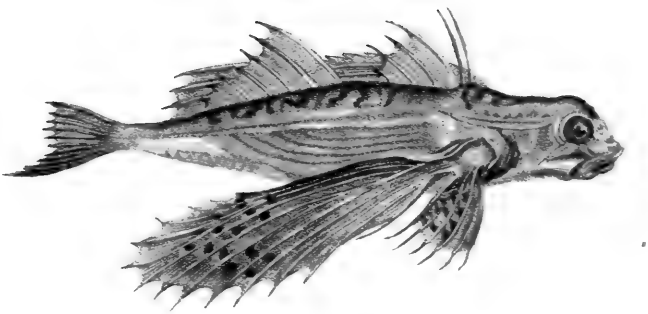
With reſpect to the growth of fiſhes, it is obſerved that CARPS, the firſt year, grow to about the ſize of a willow leaf; at two years, are about four inches long; the third ſeaſon, five inches; at four years old, ſix inches; the fifth, ſeven; afterwards from eight to twelve inches. Sea-fiſh, the fiſhermen aſſure us, muſt be ſix years old before it is fit for table. They aſſure us, MACKAREL, a year old, are as large as one's finger; thoſe of two years, twice that length; at three and four years, they are that ſmall kind of mackarel, without melts or roes; between five and ſix, they are full-grown fiſh. With regard to flat fiſhes, they tell us the turbot and barbel, at one year, are about the ſize of a crown piece; the ſecond year, as large as the palm of one's hand; nor till the fifth and ſixth year, large enough for table. So that fiſh are a conſiderable time in coming to their full growth, and are a long time deſtroyed, before they become deſtroyers.

Of

Of the ſpinous kind, the DORADO is moſt voracious; chiefly found in the tropical climates; the moſt active and moſt beautiful of its tribe. The back enamelled with ſpots, blueiſh-green and ſilver; tail and fins gold colour, of extreme brilliancy: the eyes are on each ſide the head, large and beautiful, ſurrounded with circles of ſhining gold. Theſe fiſh are always in motion, and play round ſhips in full ſail, with eaſe and ſecurity. Ever purſuing or purſued, they are continually in warfare; defending themſelves againſt the ſhark, or darting after ſmaller fiſhes. The FLYING-FISH abounds in theſe ſeas; and being ſmall, ſeldom larger than a herring, is chiefly ſought by the dorado, which being ſix feet long, not thicker than a ſalmon, and furniſhed with a full complement of fins, divides the water with amazing rapidity. The flying-fiſh has two pair of fins longer than the body, and moved by a ſtronger ſet of muſcles than any other. The efforts to ſeize on one ſide, and the arts of eſcaping on the other, are perfectly amuſing. The dorado is ſeen in full chace, darting after its prey, which will not leave the water, while it has the advantage of ſwimming, in the beginning; but, tired at laſt, and its long fins growing uſeleſs in the water, they are now exerted in flight, in a different manner and direction: by this means he riſes from the water, flutters over its ſurface two or three hundred yards, till enfeebled by this exerciſe; but they have now acquired a power of freſh efforts in the water, and of ſwimming with ſome velocity: ſtill the active enemy keeps it in view, and drives it again from the deep, till it drops at laſt into the mouth of its fierce purſuer. Should it eſcape from its enemies of the deep, yet the tropic bird and the albatroſs are ever upon the wing to ſeize it, and often whole ſhoals of them fall on ſhip-board.

It would ſeem that there is ſomething more favourable to the fecundity of fiſhes in the ocean than in freſh water. In freſh water alſo fiſhes ſeem to abate much of their courage and rapacity; purſue each other with leſs violence, and ſeem to be leſs powerfully actuated. The cod on the banks of Newfoundland, the inſtant the hook, which is only baited with the guts of the animal laſt taken, is dropped into the water, darts to it at once, and the fiſhermen have to pull up as faſt as they throw down: whereas thoſe who fiſh in freſh waters muſt wait whole hours in fruitleſs expectation; and *the patience of an angler* is proverbial.

The PIKE is the moſt active and voracious of freſh water fiſhes, and will attack every fiſh leſs than itſelf; ſometimes is choaked, by attempting to ſwallow ſuch as are too large: fiſh of all kinds, even its own, it indiſcriminately



The Flying Fiſh.

diſcriminately devours, ſo that every fiſh owes its ſafety to its minuteneſs, celerity, or courage. The pike will draw down the water-rat and young ducks while ſwimming about. Geſner mentions a mule that ſtooped to drink, when a famiſhed pike that was near ſeized it by the noſe, nor was it diſengaged till the beaſt flung it on ſhore. They will contend with the otter for his prey, and endeavour to force it from him. For this reaſon it is dreaded by all other fiſh; and ſmall ones ſhew the ſame uneaſineſs and deteſtation at the preſence of their tyrant, as little birds do at the ſight of an hawk or an owl. When the pike lies aſleep near the ſurface, as is frequent, the leſſer fiſh are often obſerved to ſwim around it in vaſt numbers, with a mixture of caution and terror.

Other tribes of freſh water fiſh chiefly ſubſiſt on worms and inſects, purſuing them at the bottom, or jumping after them to the ſurface. In winter their appetite ſeems to forſake them, at leaſt they continue ſo torpid, that few baits will tempt them. They continue in deep holes for days together, without appearing to move. The cold ſeems to affect them, they lie cloſe to the bottom, and ſeldom venture out except the day be fine, and the ſhallows tepified by the rays of the ſun. Some fiſhes may be rendered ſo torpid by the cold, in the northern rivers, as to be frozen up in their great maſſes of ice, in which they continue for ſeveral months, the priſoners of congelation, waiting the approach of a warmer ſun, to reſtore life and liberty.

Each ſpecies of fiſh is infeſted with worms of kinds peculiar to itſelf. Theſe lodge either in the jaws, and the inteſtines internally, or near the fins externally. When healthy and fat, fiſh are not much annoyed by them; but in winter, when lean or ſickly, they ſuffer very much. In ſome ſeaſons they ſuffer epidemic diſorders, and are ſeen dead by the water-ſide, without apparent cauſe; yet they are animals of all others moſt vivacious, and often live on ſubſtances poiſonous to the more perfect claſſes of animated nature. Whether the poiſonous qualities of ſome may not ariſe from this cauſe is uncertain. That they inflict poiſonous wounds is the opinion of many. Their being poiſonous, when eaten, is equally notorious; and the cauſe equally inſcrutable. Others have aſcribed the poiſon of theſe fiſhes to their feeding upon copperas beds. With us, if fiſhes, ſuch as carp or tench, acquire any diſagreeable flavour from the lakes in which they have been bred, this can be removed, by their being kept ſome time in finer and better water.

OF SHELL FISH.

THESE are divided by naturaliſts into Cruſtaceous and Teſtaceous: both totally unlike fiſhes in appearance, without bones on the inſide, but having a ſhell as an external covering. Cruſtaceous fiſh have a ſhell not quite of a ſtony hardneſs, but in ſome meaſure capable of yielding. Teſtaceous fiſhes have a ſhell of a ſtony hardneſs, brittle, and incapable of yielding. Of the cruſtaceous kinds are the lobſter and the crab: of the teſtaceous, oyſters, muſcles, cockles, and ſea ſnails, in infinite variety.

The cruſtaceous tribe ſeems placed between fiſhes, properly ſo called, and the ſnail-like or teſtaceous tribes. They have motion, and hunt for food with great avidity, like the former; but are incapable of ſwimming, and creep along the bottom, like the latter. The chief of the kind is the Lobſter; under which we rank the Prawn, Cray-Fiſh, Shrimp, Sea-Crab, Land-Crab, and their varieties.

THE LOBSTER KIND.

THE Lobſter and the Crab are in manners and conformation nearly the ſame. Voracious like fiſhes, they lead an inſect life at the bottom of the water; and are often obliged to wait till accident brings their prey. They have neither red blood nor warmth in their bodies. Whatever they ſeize on is ſure to periſh, though never ſo well defended; they even devour each other: and may, in ſome meaſure, be ſaid to eat themſelves; as they change their ſhell and their ſtomach every year, and their old ſtomach generally ſerves to glut the new.

Thoſe who firſt ſee the Lobſter, are apt to miſtake the head for the tail. The animal moves with its claws foremoſt. Theſe are his inſtruments of proviſion and defence; theſe open like a pair of nippers, have great ſtrength, take firm hold, and are uſually notched, which increaſes their tenacity. The Lobſter has eight legs, four on each ſide; theſe, with the tail, give the animal its progreſſive and ſideling motion. Between the two claws is the head, ſmall; its eyes ſeem like two black

horny ſpecks on each ſide; theſe it can advance out of the ſocket, or withdraw, at pleaſure. The mouth opens the long way of the body; has two teeth for the comminution of its food; three more are in the ſtomach, one on each ſide, the other below. Between the two teeth is a fleſhy ſubſtance, in the ſhape of a tongue. The inteſtines are one long bowel, from the mouth to the vent; but this animal is ſingular in having the ſpinal marrow in the breaſt bone. Two long feelers or horns iſſue on each ſide the head, as if to apprize the animal of danger, or prey. The tail is the grand inſtrument of motion; and with this it can raiſe itſelf in the water. Under this is lodged the ſpawn in great abundance; every pea adhering to the next by a very fine filament. Lobſters are ſuppoſed to be ſelf-impregnated! The ovary, or place where the ſpawn is firſt produced, is toward the tail, where a red ſubſtance is found, which is a cluſter of peas, too ſmall for excluſion. From this receptacle go two canals, that open on each ſide at the jointures of the ſhell, at the belly; through theſe paſſages the peas deſcend to be excluded, and placed under the tail, where the animal preſerves them from danger for ſome time, till they come to maturity; when, being furniſhed with limbs and motion, they drop off into the water.

When the young Lobſters leave the parent, they ſeek refuge in the ſmalleſt clefts of rocks, and crevices at the bottom of the ſea. They grow larger in a few weeks, from the accidental ſubſtances which the water waſhes to their retreats. They alſo acquire a hard, firm ſhell, or armour. They then quit their fortreſſes, and creep along the bottom, in hopes of plunder. Fiſh ſpawn, ſmaller of their own kind, but chiefly worms at the bottom of the ſea, ſupply them with plenty.

But the body of the Lobſter increaſing, while the ſhell remains the ſame, it becomes impriſoned within its ſhell. Young Lobſters change their ſhell oftener than the old, who remain in the ſame ſhell ſometimes two years together; but uſually all change their ſhell yearly, generally at the beginning of ſummer, when food is in plenty, and their vigour in perfection: ſoon their activity ceaſes; they forſake the open parts of the deep, ſeeking retired ſituations among the rocks or outlets, where they may remain in ſafety. Some days before the change, the animal diſcontinues its uſual voraciouſneſs; is no longer ſeen harrowing up the ſand at the bottom, or fighting, or hunting, but torpid and motionleſs. Juſt before caſting its ſhell, it throws itſelf on its back, ſtrikes its claws againſt each other, and every limb ſeems to tremble; its feelers are agitated, and the whole body in violent motion: it then ſwells in an unuſual manner; at

laſt the ſhell begins to divide at its junctures; particularly at thoſe of the belly, before but ſeemingly united. It alſo ſeems turned inſide out; and its ſtomach comes away with its ſhell. After this, it diſengages the claws, which burſt at the joints, with a tremulous motion caſting them off. Now, weak and enfeebled, it continues ſeveral hours motionleſs; many die; all are in ſuch a weakly ſtate, that they neither take food, nor venture from their retreats; they have not only the ſoftneſs, but the timidity of a worm. The dog-fiſh, the cod, and the ray, devour them by hundreds. This defenceleſs ſtate continues but a ſhort time: in leſs than two days the ſkin is grown almoſt as hard as before; its appetite increaſes, and the firſt object of its gluttony is ſaid to be its late ſtomach. This it devours eagerly, and alſo its former ſhell. In about forty-eight hours the new ſhell is perfected, and hard as the former which was but juſt thrown aſide. By its new ſhell is ſeen that it has grown in a very few days above a third in ſize.

At certain ſeaſons of the year, theſe animals never meet without engagement. The loſs of a leg, or a claw, is no great calamity; the victor carries off the ſpoil to feaſt on, while the vanquiſhed retires from the defeat, to wait for a thorough repair. Where the joint of the claw was cut away, is ſeen in a moſt ſurpriſing manner to burgeon out, the beginning of a new claw; at firſt ſmall and tender, but in three weeks time almoſt as large and powerful as the old one: but it never arrives to the full ſize.

Of this extraordinary yet well-known creature, are many varieties. Some three feet long, and (if the ſhrimp and the prawn be of the claſs, though unfurniſhed with claws) others not above an inch. All live in the water, and can bear its abſence for a few hours. The ſhell is black when freſh, but turns red by boiling.

The Lobſters creep into a baſket of wicker-work, let into eight or ten fathom water, for the bait, but cannot get out again. The river Crayfiſh differs little from the Lobſter, but that it lives only in freſh water; the other only in the ſea.

The CRAB is found equally in freſh and ſalt water; upon land as well as in the ocean; its ſhape differs much from the Lobſter, which it reſembles in habits and conformation. The tail is the broad flap that covers part of the belly, and when lifted diſcovers the ſpawn in great abundance. Its claws are two; its legs eight, four on either ſide. It is bold, and voracious, and quarrelſome. It reſembles the Lobſter, except in its amaz-

ing

ing bulk of body compared to its head, and the length of its inteſtines, which have many convolutions.

The LAND CRAB is found in ſome of the warmer regions of Europe, and abundantly in the tropical climates of Africa and America. Various kinds, endued with various properties; ſome healthful, delicious, and nouriſhing; others very poiſonous and malignant; ſome half an inch, others a foot broad; ſome are of a dirty brown; others beautifully mottled.

That called the VIOLET CRAB, of the Caribbee Iſlands, is the moſt noted for its ſhape, its delicacy, and its manners. It ſomewhat reſembles two hands cut through the middle and joined together; for each ſide looks like four fingers, and the two claws the thumbs. The body is covered with a ſhell as large as a man's hand, bunched in the middle, on the fore-part of which are two long eyes, the ſize of a grain of barley, tranſparent as cryſtal, and hard as horn. A little below theſe is the mouth, covered with a ſort of barbs, under which are two broad ſharp teeth, white as ſnow; not placed croſs-ways, but rather like the blades of a pair of ſciſſars. With theſe teeth they cut leaves, fruits, and rotten wood, which is their uſual food. But their principal inſtrument for ſeizing is their nippers, which hold ſo tight, that the animal loſes the limb ſooner than its graſp; and is often ſeen ſcampering off, having left its claw ſtill holding faſt the enemy, which keeps for above a minute faſtened on the finger after the crab is making off. In fact, it loſes no great matter by leaving a leg or an arm, for they ſoon grow again. They live in a kind of ſociety in the mountains; but regularly once a year march down to the ſea-ſide, in a body of ſome millions. They chuſe April or May for their expedition; ſallying out by thouſands from hollow trees, the clefts of rocks, and holes which they dig under the earth. The proceſſion ſets forward from the mountains, with the regularity of an army under the guidance of an experienced commander. The firſt diviſion conſiſts of the ſtrongeſt and boldeſt males. Theſe are often obliged to halt for want of rain. The main body is compoſed of females (which never leave the mountains till the rain is ſet in) forming columns of fifty paces broad, and three miles deep, almoſt covering the ground. Three or four days after this the rear guard follows; a ſtraggling tribe of males and females, neither ſo robuſt nor ſo numerous as the former. The night is their chief time of proceeding; but if it rains by day, they profit by it, and move forward in their ſlow uniform manner. When the ſun ſhines hot, they halt, and wait till the cool of the evening. When terrified,

terrified, they march back in confuſion, holding up their nippers, which they often clatter together, as if threatening their diſturbers. If any one is maimed, and incapable of proceeding, the reſt devour it on the ſpot, and purſue their journey. After a thouſand dangers (ſometimes during three months) they arrive at their deſtined port, and prepare to caſt their ſpawn. The peas are within their bodies, not under the tail; for the creature waits the benefit of the ſea-water to help delivery. The Crab having reached the ſhore, eagerly goes to the water's edge, and lets the waves waſh over its body, then withdraws to land. In a little time the ſpawn grows larger, is excluded, and ſticks under the tail, as big as a hen's egg, and exactly reſembling the rowes of herrings. In this ſtate they once more ſeek the ſhore, and ſhaking off their ſpawn into the water, leave accident to bring it to maturity. At this time ſhoals of fiſh attend, in expectation of this annual ſupply; and two thirds, perhaps, of the crabs eggs are immediately devoured by them. Thoſe that eſcape are hatched under the ſand; and ſoon after millions of little crabs are ſeen quitting the ſhore, and ſlowly travelling up to the mountains. The old ones have become ſo feeble and lean, they can hardly creep, and their fleſh changes its colour. Moſt of them continue in the flat parts of the country till they recover, in holes in the earth: there throwing off their old ſhells, as it were whole, the place where they opened on the belly being unſeen: they become naked, and almoſt motionleſs for a week together. They have under their ſtomachs four large white ſtones, which gradually decreaſe as the ſhell hardens, at which time the animal is ſeen ſlowly making its way back; all this is commonly performed in ſix weeks. This Crab, when in the mountains, is impregnable; ſubſiſting on vegetables, it ſeldom ventures out; and its habitation is inacceſſible. It is only when compelled to deſcend into the flat country that it is taken. The natives wait its deſcent, and deſtroy thouſands; but only ſeek that ſmall ſpawn which lies on each ſide the ſtomach within the ſhell, about the thickneſs of a man's thumb. On their return, being covered with a new ſkin, reſembling ſoft parchment, almoſt every part except the ſtomach may be eaten. They are taken in their holes by feeling for them in the ground with an inſtrument; or ſought after by night with flambeaux. The inſtant it perceives itſelf attacked, it falls backward, and with its claws pinches moſt terribly. But the dexterous crab-catcher takes them by the hinder legs in ſuch a manner, that its nippers cannot toueh him, and throws it into his bag.

Many are found poiſonous, having fed, as it is thought, on the manchinel

chinel apple; and whenever they are found under that noxious plant, they are always rejected.

The SOLDIER CRAB has ſome ſimilitude to the Lobſter, without its ſhell. Uſually four inches long, no ſhell behind, but covered to the tail with a rough ſkin, terminating in a point: ſtrong hard nippers before, like the Lobſter; one of them is as thick as a man's thumb, and pinches moſt powerfully. Theſe have no ſhell, but take poſſeſſion of one deſerted by ſome other animal; it there reſides till too large for its habitation: like the former, deſcending yearly from the mountains to the ſea-ſhore, to depoſit its ſpawn, and to procure a new ſhell. It is very probable that its firſt care is to provide for its offspring; and it is thought, from the number of little ſhells which it is ſeen examining, that it depoſits its ſpawn in them. After many trials and combats for a new ſhell, the ſoldier is equipped. There is often a conteſt between two for ſome well-looking favourite habitation; both endeavouring to take poſſeſſion; they ſtrike with their claws; and bite till the weakeſt is obliged to yield.

When this animal is taken, it ſends forth a feeble cry, endeavouring to ſeize the enemy with its nippers; with which, if it faſtens, it will ſooner die than quit the graſp. The wound is very painful, and not eaſily cured. For this reaſon, and as it is not much eſteemed for its fleſh, it is generally permitted to return ſafely to its old retreat in the mountains.

TESTACEOUS FISHES.

THE manners of this claſs of creatures, that for the moſt part creep along the bottom, or are driven by the waves, is almoſt entirely unknown. The wreathing of their ſhells, or their ſpots, have been deſcribed; but of their appetites, combats, eſcapes, and arts of ſubſiſtence, we are ignorant.

A ſhell is a natural habitation; hard and ſtony; often partly derived by the animal from ſurrounding objects; the fluids of the animal furniſhing the cement. Theſe unite into that firm covering which ſhell-fiſh generally reſide in.

As we cannot deſcribe the modes of the deep, and its peculiarities, to give exact ideas of the manner in which ſea-ſhells are formed, we muſt advert to an animal within our inſpection, with the formation of whoſe ſhell we are beſt acquainted: ſuch is the Garden-Snail, with whoſe hiſtory Swammerdam has taken endleſs pains. The ſame manner of formation extends to all animals having ſhells, whether on land or in the water. The young ſnail, at leaving the egg, carries its ſhell on its back, being arrived at a certain growth, and its little habitation ſufficiently hardened. This beginning of the ſhell only equals a pin's head, but grows rapidly, having at firſt but two circumvolutions. As the animal increaſes in ſize, theſe circumvolutions increaſe alſo, until they be five in number, which is never exceeded in land ſnails, but ſea ſnails ſometimes have ten. The animal enlarges its ſhell at the mouth, with its little teeth biting and clearing away the ſcaly ſkin from the edges, and then adds another rim to its ſhell. Its whole body is furniſhed with glands, from which flows out a kind of ſlimy fluid, like ſmall ſpiders threads, which unite in one common ſurface, and by time condenſe into a ſtony hardneſs. It is that gliſtening ſubſtance which it leaves after its track. This fluid paſſes through an infinite number of little glands till it arrives at the pores of the ſkin, but is there ſtopped by the ſhell below; and therefore riſes to the mouth of the ſhell, where enlargement is wanted. There the firſt layer of ſlime ſoon hardens; then another is added, which hardens alſo, till the ſhell becomes as thick as is requiſite. Thus every ſhell may be conſidered as compoſed of a number of layers of ſlime, which have entirely proceeded from the animal's own body. If the external coat be ſcaled off, the inner ſubſtance will be found of one ſimple colouring; which hints that the animal's own juices give only one colour; whereas we ſee ſome ſhells ſtained with an hundred: ſometimes perhaps borrowed from ſurrounding objects. Others think, that as in the body of every one of theſe animals ſeveral ſtreaks are diſcerned of a different colour, the juices flowing from thoſe parts will be alſo of a different hue, and will conformably tinge that part of the ſhell which their ſlime compoſes.

Shells have generally a white ground, tinctured with red, yellow, brown, green, and other ſhades and mixtures, but never blue; for blue is a colour which ſea-water changes.

Convolutions, prominences, and general form depend on the animal, and uſually bear ſome reſemblance to the body on which they are moulded.

moulded. If the animal has any tumour or excreſcence, it creates a ſwelling in that part of the incruſtation to which it correſponds. When it makes additions to its apartments, the ſame protuberance which had raiſed the ſhell before, ſwells it again at ſome little diſtance, by which the ſame inequality runs ſpirally all round the ſhell. Sometimes theſe tumours are ſo large, or pointed, that their counterparts in the incruſtation appear like horns: theſe quitted, and others made, increaſes their number. If the body be channelled, the ſhell that covers it will be channelled likewiſe. Their diverſity is ſo great, their figures and colours ſo very ſtriking, that ſeveral perſons have made their arrangement the buſineſs of their lives. Some ſhells, ſuch as the Stairs Shell, or the Admiral Shell, are equally precious, by their ſcarceneſs, as pearls. Shells exhibit great difference of figure; flat, concave, long, lunated, drawn round in a circle, the orbit cut in two; ſome riſing on the back, ſome ſmooth, ſome wrinkled, toothed, ſtreaked, the point variouſly intorted, the mouth pointing like a dagger, folded back, bent inwards: all theſe variations, and many more, furniſh at once novelty, elegance, and ſpeculation.

Ariſtotle has divided them into three kinds: firſt, the Univalve, or Turbinated, which conſiſt of one piece, like the box of a ſnail; ſecondly, the Bivalve, conſiſting of two pieces, united by a hinge, like an oyſter; thirdly, the Multivalve, conſiſting of more than two pieces, as the Acorn Shell, which has not leſs than twelve. Thoſe fiſhed up from the deep, are called by the Latin name *pelagii*; thoſe caſt on ſhore, are called *littorales*. Many of the *pelagii* are never ſeen on ſhore; they continue in their native depths, and we owe their capture to accident.

Sea-ſhells exceed both land and foſſil ſhells in beauty, in high poliſh, and in brilliant and various colouring. Freſh-waters have but two kinds of ſhells; the bivalved and the turbinated. Land ſhells are but of one kind, the turbinated; but in that are four or five very beautiful varieties. Foſſil, or *extraneous* ſhells, are in great numbers, and of as many kinds as in the ſea itſelf, and which our moſt exact and induſtrious ſhell-collectors have not been able to fiſh up from the deep, and probably thouſands of different forms ſtill remain at the bottom unknown.

OF TURBINATED SHELL-FISH.

TO conceive the manner in which certain animals ſubſiſt at the bottom of the deep, we muſt again have recourſe to one of a ſimilar nature and formation that we know.

The Snail is ſupriſingly fitted for the life it is to lead. Its organs of life are almoſt as complete as the largeſt animal; tongue, brain, ſalival ducts, glands, nerves, ſtomach, inteſtines; liver, heart, and blood-veſſels: beſides this, it has a purple bag that furniſhes a red matter to different parts of the body, together with ſtrong muſcles that hold it to the ſhell, and which are hardened, like tendons, at their inſertion.

Its firſt ſtriking peculiarity is its eyes on the points of its largeſt horns. When the Snail is in motion, four horns appear; the two uppermoſt and longeſt deſerve peculiar conſideration, having the eyes fixed at their extreme ends, appearing like two blackiſh points. When taken out of the body, they are of a bulbous figure; they have but one coat; and the three humours, the vitreous, the aqueous, and the cryſtalline, are indiſtinct. The eyes are directed to different objects at pleaſure, by a regular motion out of the body; or hidden, by a very ſwift contraction into the body. Under the ſmall horns is the mouth, furniſhed with eight ridges or teeth.

Every ſnail is at once male and female; and while it impregnates another, is itſelf impregnated; veſſels ſupplying the fluid are placed chiefly in the fore part of the neck, and extend over the body; but the organs of both ſexes are always found united, and growing together. A large opening on the right ſide of the neck, gives a paſſage to excrements, ſerves as an opening for reſpiration, and alſo as an organ of generation; within which each has other neceſſary parts, and from which apertures, they being greatly dilated, two organs, reſembling inteſtines, are ſeen iſſuing: from the ſame aperture they lance a kind of dart, which is pretty hard, barbed, and ending in a very ſharp point; ſome minutes after, the ſnail which received the weapon, darts one of its own at its antagoniſt, which is received in like manner; then ſoftly approaching nearer, they cloſe with each other. This is generally thrice repeated, at intervals of fifteen days; and, at every time, a new dart is mutually emitted.

After

After eighteen days they produce their eggs, at the opening of the neck, and hide them in the earth with the greateſt ſolicitude. Theſe eggs are in great numbers, round, white, and covered with a ſoft ſhell; ſticking to each other by an imperceptible ſlime: about the ſize of a ſmall pea.

Sometimes theſe animals are cruſhed ſeemingly to pieces and utterly deſtroyed; yet, in a few days, they mend their numerous breaches by the ſame ſubſtance of which the ſhell is originally made. They are ſometimes ſeen with eight or ten of theſe patches; but though poſſeſſing power to mend its ſhell, it cannot, when at full growth, make a new one.

The Snail is very voracious; ſubſiſts on the leaves of plants and trees; but is very delicate in its choice. The animal moves forward by means of that broad muſcular ſkin which ſometimes is ſeen projecting round the mouth of the ſhell; this is expanded before, and then contracted with a kind of undulating motion; alſo by its ſlimy ſubſtance, with which it is copiouſly furniſhed, and which it emits wherever it moves, as on a kind of carpet, it proceeds ſlowly along, without danger of wounding its tender body againſt aſperities; by this it aſcends to its food on trees, and by this deſcends, without danger of falling, and breaking its ſhell.

At the approach of winter, the Snail buries itſelf in the earth, or retires to ſome hole, to continue torpid during the ſeverity of the ſeaſon: ſometimes alone; but more frequently ſeveral are found together, apparently deprived of life and ſenſation. For warmth and ſecurity, the Snail forms a cover or lid to the mouth of its ſhell with its ſlime, which ſtops it up entirely, and thus protects it from every external danger: this is whitiſh, pretty hard and ſolid, yet porous and thin to admit air, without which the animal cannot live. The Snail awakes one of the firſt fine days of April, breaks open its cell, and ſallies forth for nouriſhment: being very voracious, at firſt almoſt any vegetable that is green ſeems welcome; but the ſucculent plants of the garden, and the various kinds of pulſe, are at ſome ſeaſons almoſt wholly deſtroyed by their numbers. So great is the multiplication of ſnails at ſome years, that gardeners imagine they burſt from the earth. A wet ſeaſon is generally favourable to their production; for very dry ſeaſons, or dry places, cauſe too great a conſumption of its ſlime, without plenty of which it cannot ſubſiſt in health and vigour.

Of the Sea-Snail naturaliſts have mentioned fifteen kinds; of the Freſh-water-Snail eight kinds; and of the Land-Snail five. Theſe ſtrongly reſemble

reſemble the garden ſnail, in the formation of their ſhell, in their hermaphrodite natures, in the ſlimy ſubſtance with which they are covered, in the formation of their inteſtines, and in the diſpoſition and uſes of the hole on the right ſide of the neck; yet there are one or two remarkable diſtinctions: the FRESH-WATER SNAIL, and probably all ſnails that live in water, have a contrivance for riſing to the ſurface, or ſinking to the bottom. This is by opening and ſhutting the orifice on the right ſide of the neck, which is furniſhed with muſcles for that purpoſe, in order to draw in or expel the air, as it finds occaſion. By dilating this it riſes; by compreſſing it, it ſinks. It is alſo viviparous, and brings forth its young not only alive, but with their ſhells, in ſome degree of perfection.

"March 12," ſays Swammerdam, "I began my obſervations on this ſnail, and collected a great number, which I put into a large baſon filled with rain-water, and fed for a long time with potter's earth diſſolved in it. I opened one of theſe ſnails, when I found nine living ſnails in its womb: the largeſt were placed foremoſt, as the firſt candidates for excluſion. I put them into freſh-water, and they lived to the eighteenth of the ſame month, moving and ſwimming, like ſnails full grown."

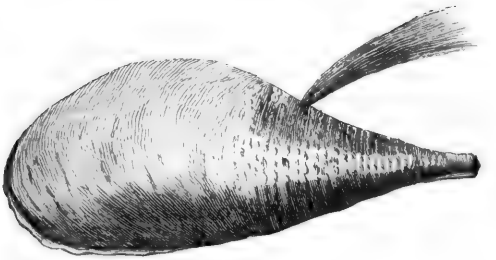
Of the ſea kinds alſo, ſome are viviparous, while other lay eggs. Such are one or two of the Buccinums; within which living young have been frequently found upon diſſection. In general the reſt of this numerous claſs bring forth eggs; from whence the animal burſts at maturity, completely equipped with an houſe, which the element where it reſides does not prevent from enlarging.

Among ſome of the ſea kinds one impregnates the other; but is incapable of impregnation by the ſame, and receives it from a third, which is itſelf impregnated by a fourth. In this manner Mr. Adanſon has ſeen vaſt numbers of ſea ſnails united together in a chain. In the *bulin* and the *coret* the orifices are ſeparate from each other: that which performs the office of the male being at the origin of the horns; the other farther down on the neck. In general all that have this orifice on the right ſide, have their ſhells turned from right to left; on the contrary, thoſe which have it on the left ſide, have their ſhells turned from left to right.

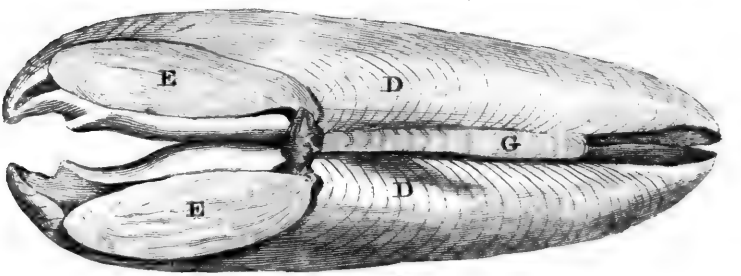
Many ſea ſnails want horns, and none have above two. Eyes are unneceſſary to creatures whoſe food is uſually concealed in the darkeſt places; and who, poſſeſſed of very little motion, are obliged to grope for what they ſubſiſt on.—Sea ſnails are larger than land ſnails.

The mouth, in the garden and the freſh-water ſnails, is placed croſſ-

PINNA MARINA

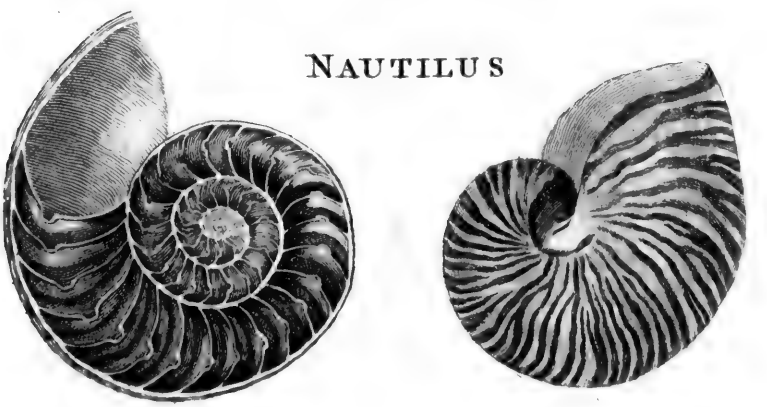


PHOLADE F



F

NAUTILUS



wiſe, as in quadrupedes. In moſt ſea ſnails, the mouth is placed longitudinally, but in ſome obliquely, or on one ſide. Others, of the Trochus kind have no mouth; but a trunk, very long in ſome kinds, and ſhorter in others. This trunk is fleſhy, muſcular, ſupple, and hollow. Its extremity is bordered with a cartilage, and toothed like a ſaw. Theſe are, among ſnails, what the tiger, the eagle, or the ſhark is among beaſts, birds, or fiſhes. The whole race of ſhelled animals avoid their approach; though of a thick clumſy ſhell themſelves, they move with greater ſwiftneſs at the bottom than moſt ſhell fiſh; and ſeize their prey with greater facility. No ſhell ſo large but they will boldly venture to attack it; and, with their piercing auger-like trunk, will quickly bore it through. No efforts the invaded animal makes avail: if it expand itſelf, and riſe to the ſurface, the enemy riſes with it; if it ſink to the bottom, its deſtroyer cloſely adheres. Thus this carnivorous ſhell-fiſh ſticks for ſeveral days, or weeks, to its prey, until with its trunk it has ſucked out all ſubſtance, or until it drops off when the other begins to putrefy.

Beſide a thick ſhell, many ſnails are furniſhed with a lid, which opens and ſhuts at pleaſure. When hunting for food, it opens its box, gropes or ſwims about; when ſatisfied, drops its lid, and ſinks to the bottom; where it might be ſuppoſed in perfect ſecurity, but that the trochus breaks into its incloſure. Scarce a ſhell is met with entire and ſound to the end of its convolutions; but the thinneſt ſhells are moſt ſubject to this invaſion.

Of all ſea ſnails, that moſt frequently ſeen ſwimming, and whoſe ſhell is thinneſt, is the NAUTILUS. Whether it is thus employed in eſcaping its enemies at the bottom, or in ſeeking food at the ſurface, may be doubted. Its ſtomach contains chiefly food found at the bottom. Its induſtry, therefore, may be owing to its fears; and its arts of ſailing may have been originally the product of neceſſity.

There are ſeveral ſpecies of the nautilus, yet all may be reſolved into two: one with a white ſhell, thin as paper, which it often quits, and reſumes; the other with a thicker ſhell, ſometimes of a beautiful mother-of-pearl colour, and that quits its ſhell but rarely. This ſhell outwardly reſembles that of a large ſnail, but is generally ſix or eight inches acroſs: within, it is divided into forty partitions, that communicate with each other by orifices through which one could ſcarce thruſt a gooſe-quill: almoſt the whole interior is filled by the animal; whoſe body is divided into as many parts as its ſhell has chambers: theſe parts communicate with each other, though the openings, by a long blood-veſſel, which runs

from the head to the tail: thus the body of the animal, when out of the ſhell, reſembles a number of ſoft bits of fleſh, threaded on a ſtring. How it contrives to diſengage its body from ſo intricate an habitation; how it makes a ſubſtance, to appearance almoſt as thick as one's wriſt, paſs through forty openings, each ſcarcely admitting a gooſe quill, is not diſcovered: but the fact is certain; for the animal is often found without its ſhell; and the ſhell more frequently without the animal. This animal, particularly that of the white light kind, is chiefly found in the Mediterranean. When the ſea is calm, they are obſerved floating on the ſurface; ſome ſpreading their little ſail; ſome rowing with their feet, as if for life and death; others floating on their mouths, like a ſhip keel upwards. If taken while thus employed, the extraordinary mechaniſm of their limbs for ſailing appears manifeſt. The nautilus is furniſhed with eight feet, which iſſue near the mouth, and may as properly be called barbs: theſe are connected to each other by a thin membrane, like that between the toes of a duck, but much thinner and more tranſparent. Of theſe eight feet thus connected, ſix are ſhort: theſe are held up as ſails to catch the wind; the two others, being longer, are kept in the water; ſerving, like paddles, to ſteer its courſe. When the weather is quite calm, and the animal is purſued from below, it expands only part of its ſail, rowing with the reſt: when interrupted, or alarmed from above, it inſtantly furls the ſail, catches in all its oars, turns its ſhell mouth downward, and ſinks to the bottom. Sometimes it is ſeen pumping the water from its leaking hulk; and, when unfit for ſailing, deſerts its ſhell entirely. The forſaken hulk is ſeen floating along, till it daſhes, by a kind of ſhipwreck, on the rocks or the ſhore.

OF BIVALVED SHELL-FISH, OR SHELLS OF THE OYSTER KIND.

WE ſhall find theſe in every reſpect inferior to ſnails we have been deſcribing; in their ſenſations; in their powers of motion; in their generation. All the bivalve tribe are hermaphrodite, but require no aſſiſtance from each other towards impregnation; and a ſingle muſſel or oyſter, were there no other in the world, would quickly repleniſh the ocean.

As the land ſnail, being beſt known, took the lead in the former claſs, for the ſame reaſon the freſh-water muſſel may take the lead in this.

The muſſel of freſh or ſalt water has two equal ſhells, joined at the back by a ſtrong muſcular ligament that ſerves as a hinge. The animal can open its ſhells, at pleaſure, about a quarter of an inch. It is fixed to each ſhell by four tendons, which ſhut them cloſe, and keep its body firm from being cruſhed by any ſhock againſt its own habitation. Its vital organs are ſituated in a very extraordinary manner. It has a mouth furniſhed with two fleſhy lips; its inteſtine begins at the bottom of the mouth, paſſes through the brain, and makes a number of circumvolutions through the liver; then goes on ſtraight into the heart, which it penetrates, and ends in the anus; near which the lungs are placed, and through which it breathes, like thoſe of the ſnail kind; and in this manner its languid circulation is thought to be carried on. Each muſſel has two ovaries, by which it is female; and two ſeminal veſſels, as a male. Each has its own proper canal: by the ovary canal the eggs deſcend to the anus; where the ſeminal canals ſend their fluids to impregnate them. Thus one ſingle animal ſuffices for generation; and the eggs are impregnated and excluded by itſelf alone. The ovaries uſually empty themſelves of eggs in ſpring, and are repleniſhed in autumn. The fecundity of the ſnail kind is trifling in compariſon to the fertility of theſe. Their quick multiplication alone inſures the continuation of their ſpecies.

The multitude of theſe animals in ſome places is very great; but the numbers of their deſtroyers are in equal proportion. The crab, the cray-fiſh, and many other animals, devour them; and the trochus is their moſt formidable enemy. But it ſeems ſtill more fearful of the agitations of the element in which it reſides; for if daſhed againſt rocks, or thrown far on the beach, it is inevitably deſtroyed. To guard againſt this, the moſt fatal of accidents, it is furniſhed with a capacity of binding itſelf by a number of threads to whatever object it approaches: theſe Reaumur ſuppoſed it ſpun artificially, as ſpiders their webs; but the extreme length of this beard in ſome, which far exceeds that of the body, ſeems impoſſible to be manufactured by thruſting out and drawing in the tongue, with the glutinous matter of which the French philoſopher ſuppoſed thoſe threads were formed. It alſo increaſes with the animal; and, as the muſſel becomes larger and older, the beard becomes longer, and its filaments ſtronger. By theſe threads they adhere to fixed objects; and ſometimes, when ſuch are wanting, to each other; and though thrown into a lake ſeparately, they are taken out in bunches of many together.

Its inſtrument of motion, from place to place, is that muſcular ſubſtance reſembling a tongue, which is in ſome two inches long, in others not one. This, being thruſt out of its ſhell, is capable of making a ſlight furrow in the ſand. By means of this furrow the muſſel can erect itſelf on the edge of its ſhell; and prolonging this furrow as it advances, it projects its tongue, that anſwers the purpoſe of an arm, and thus carries its ſhell edge-ways, as in a groove. Where it determines to reſide, it fixes the ends of its beard; and thus, like a ſhip at anchor, braves all the agitations of the water. Sometimes the animal is attached by a large number of threads; ſometimes but by three or four, that ſeem ſcarce able to retain it. It lives on little earthy particles that the water tranſports to its ſhells, and perhaps the fleſh of the moſt diminutive animals. However, ſome of this kind have been found a foot long. Of the beard the natives of Palermo ſometimes make gloves and ſtockings.

Theſe ſhell-fiſh are found in lakes, rivers, and the ſea. Thoſe of lakes often grow very large; but they ſeem ſolitary, and are found generally ſeparate. Thoſe of rivers are not ſo large, but more numerous: the ſea muſſel is the moſt abundant. Theſe are often bred artificially in ſalt-water marſhes overflowed by the tide: being thrown in at proper ſeaſons, undiſturbed by the agitations of the ſea, and not preyed on by their powerful enemies, they caſt their eggs, which ſoon become mature, and are generally found in cluſters of ſeveral dozen together. It requires a year for the peopling a muſſel-bed; ſo that, if the number conſiſts of forty thouſand, a tenth part may annually be left for peopling the bed anew.

The OYSTER differs little from the muſſel, except in its thickneſs of ſhell, and greater imbecillity. Has organs of life and reſpiration, very voluminous inteſtines, a liver, lungs, and heart. Is ſelf-impregnated; opens its ſhells to receive the influx of water, and is ſtrongly attached to its ſhell both above and below. Theſe ſhells are not equal, one being cupped, the other flat; it always reſts on the cupped ſhell, for if it lay on the flat ſide it would loſe all its water. Its ſhells are ſo ſtrongly lined and defended, that no animal will attempt to pierce them. But it often ſerves as an object to which pipe-worms, corallines, and other little animals, fix their habitation, and live in ſecurity. Among the number of theſe is a little red worm, often found on the ſhell; which ſome erroneouſly ſuppoſed to impregnate their ſpawn. The oyſter is utterly unable to change its ſituation; but is attached very firmly to objects. Rocks, ſtones, timber, ſea weeds, all ſeem proper to give it a fixture, and to ſecure it againſt the agitation of the waves. Nothing

ſo

ſo common in the rivers of the tropical climates, as to ſee oyſters hanging amidſt the branches of the foreſt. Many trees which grow along the banks bend their branches into the water, particularly the mangrove. To theſe the oyſters hang in cluſters, like apples on a tree; and as the weight of the fiſh ſinks the branch into the water, where it ſtill continues growing, the number of oyſters increaſe, and hang upon it. They are often found to ſtick to each other. This is effected by means of a glue proper to themſelves, which, when cemented, is as hard as the ſhell, and is as difficultly broken. The joining ſubſtance, however, is not always glue; but the animal grows to the rocks, ſomewhat like the muſſel, by threads which take root in the ſhell, and not from the body of the fiſh.

Oyſters uſually caſt their ſpawn in May, which at firſt appear like drops of candle-greaſe, and ſtick to any hard ſubſtance: theſe are covered with a ſhell in two or three days. In three years the animal is large enough to be brought to market. Oyſters prepared in beds are not ſo large as rock-oyſters, which are ſometimes as broad as a plate, and admired by ſome as excellent. In the Eaſt Indies, ſome oyſter ſhells are two feet over, and the fiſh capable of furniſhing a plentiful meal to eight or ten men; but no way comparable to ours for flavour.

Other bivalved ſhell-fiſh, the cockle, the ſcallop, and the razor-ſhell, have other ſmall differences in form or manners; but their power of changing place is their greateſt difference. The SCALLOP is remarkable for its method of moving on land, or ſwimming on the ſurface of the water. When deſerted by the tide, it makes remarkable efforts to regain the water. Firſt gaping widely its ſhells, often an inch, then ſhutting them with a jerk, it riſes five or ſix inches from the ground. It thus tumbles any how forward repeatedly, till it has attained its journey's end. When in the water it is capable of ſupporting itſelf on the ſurface; there opening and ſhutting its ſhells, it tumbles over and over, and makes its way with ſome celerity.

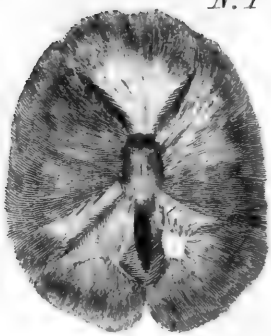
The PIVOT or RAZOR-SHELL has a very different kind of motion; having only a power of ſinking point downward. Its ſhells reſemble the haft of a razor; and by this form it is better enabled to dive into the ſoft ſand at the bottom. All its motions are confined to ſinking or riſing, a foot downwards or upwards, in the ſand; for it never leaves the ſpot where firſt it was planted. From time to time it is ſeen to riſe about half way out of its hole; but, if diſturbed, it ſinks perpendicularly down again. Juſt over the place where the razor is buried, is a ſmall hole like a chim-

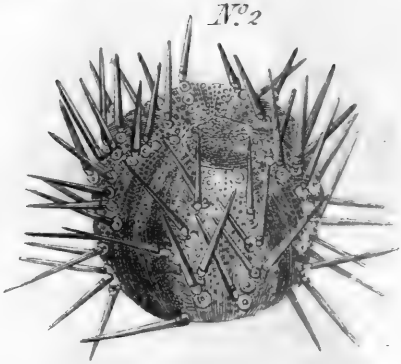
a chimney, through which the animal breathes, or imbibes the ſea-water. At low water, theſe holes are eaſily diſtinguiſhed by the fiſhermen, whoſe method of enticing the razor up from the depth of its retreat is by ſprinkling a little ſea-ſalt on the hole. This melting, no ſooner reaches the razor below than it riſes inſtantly ſtraight upwards, and ſhews about half its length above the ſurface. This is inſtantaneous; and if the fiſher does not ſeize the opportunity, the razor buries itſelf with great eaſe to its former depth. There it continues ſecure; no ſalt can allure it a ſecond time; but it remains unmoleſted, unleſs the fiſher will be at the trouble of digging it out ſometimes two feet below the ſurface.

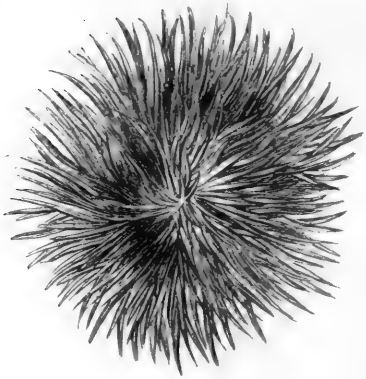
In this claſs of ſhell-fiſh PEARLS are found uſually generated, in the internal parts of ſhells that are of a ſhining ſilvery colour, as well in the muſſel or the ſcallop as in the oyſter, and in all bivalved ſhells whoſe inſides reſemble mother-of-pearl. The oyſter that breeds a large pearl always breeds a large ſhell, and the ſhell itſelf indents to receive its impreſſion. The pearl is probably accidentally produced by the ſame matter as forms the ſhell. It is ſoft at firſt, but quickly hardens; and by ſucceſſive coats, layer over layer, acquires its dimenſions. Sometimes a ſmall ſpeck is ſeen in the middle, on which the coats were originally formed. The pearl oyſter has a large ſtrong whitiſh ſhell, wrinkled and rough without, within ſmooth and ſilver-coloured. From theſe mother-of-pearl is taken, which is the internal coats of the ſhell. The pearl is chiefly prized; being found but in few, generally adhering, ſometimes making a print in the body of the ſhell, ſometimes at large within the ſubſtance of the fiſh.

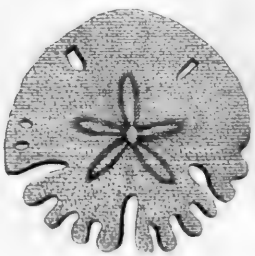
There are many pearl fiſheries in America and Aſia; but thoſe of America are greatly diſcontinued. The moſt famous of the Aſiatic fiſheries is in the Perſian Gulph, and the moſt valuable pearls are brought from thence. Their value increaſes in proportion to their ſize, their figure, and colour; ſome are white, others yellowiſh, others a lead colour, and ſome black as jet. What occaſions theſe different tinctures is unknown. All pearls in time become yellow; they may be conſidered as an animal ſubſtance, converted into a ſtony hardneſs, and like ivory taking a tincture from the air. They alſo decay if kept in damp or vaulted places, and moulder into a ſubſtance ſcarce harder than chalk.

Sea Erchins









OF MULTIVALVE SHELL-FISH.

OF theſe are principally two kinds; ſuch as move, and ſuch as are ſtationary: the firſt are often known by the name of *ſea-eggs*; by naturaliſts, Echini, or Urchins: the latter are called Pholades or File-Fiſh. Of both there are ſeveral ſorts.

The SEA-URCHIN may be compared to the huſk of a cheſtnut, being round, and with bony prickles on every ſide. The mouth is below, the vent above; the ſhell is a hollow vaſe, reſembling a ſcooped apple, filled with a ſoft, muſcular ſubſtance, through which the inteſtines wind from the bottom to the top. The mouth is large and red, furniſhed with five ſharp teeth, which are eaſily diſcerned. The jaws are ſtrengthened by five ſmall bones, in the centre of which is a ſmall fleſhy tongue; from this the inteſtines make a winding of five ſpires, round the internal ſides of the ſhell, ending at the vent at top. Its horns are moveable, like the horns of a ſnail, and point from every part of the body, ſerving at once as legs to move on, as arms to feel with, and as inſtruments of capture and defence. Between theſe horns it has ſpines not endued with ſuch a ſhare of motion. The ſpines are hard and prickly; the horns ſoft, longer than the ſpines, and hid at the baſes of the ſpines. This apparatus is only ſeen when the animal is hunting its prey at the bottom of the water; for, a few minutes after it is taken, all the horns are withdrawn into the body, and moſt of the ſpines drop off. Furniſhed with two thouſand ſpines, and twelve hundred horns, all ſerving for legs, and from their number ſeeming to impede each other's motion, yet it runs not without ſwiftneſs at the bottom, and it is ſometimes not eaſy to overtake it. It is often taken on the ebb, by following it in ſhallow water, either in an ozier baſket, or ſimply with the hand. Both the ſpines and the horns aſſiſt its motion; and the animal is uſually ſeen running with the mouth downward.

Some kinds are as good eating as the lobſter; their eggs, which are of a deep red, are conſidered as a very great delicacy. Of others the taſte is but indifferent; and in all places, except the Mediterranean, they are little ſought for, except as objects of curioſity.

The Acorn Shell-fiſh, the Thumb-footed Shell-fiſh, and the Barnacle, are fixed to one ſpot, and appear to vegetate from a ſtalk like a kind of fungus, growing in the deep, deſtitute of animal life as well as motion:

but the animal reſiding within the ſhell has not only life, but ſome degree of voraciouſneſs; it has a cover to open and ſhut its ſhell at pleaſure, and twelve long crooked arms, furniſhed with hair, which it thruſts forth for its prey, and eight ſmaller, which are generally kept in the ſhell. They are found adhering to every ſubſtance in the ocean; rocks, roots of trees, ſhips' bottoms, whales, lobſters, and even crabs, like bunches of grapes clung to each other. It is amuſing enough to behold their operations: when the ſea is calm, they are ſeen opening the lid, and peeping about them; they then thruſt out their long neck, look round them for ſome time, and then abruptly retreat back into their box, ſhut their lid, and lurk in darkneſs and ſecurity. Some people eat them.

Of all the ſhelly tribe, the PHOLADES are the moſt wonderful. They are found in different places; ſometimes in their proper ſhell, at the bottom of the water; ſometimes concealed in lumps of marly earth; ſometimes lodged, ſhell and all, in the body of the hardeſt marble. In their proper ſhell they aſſume different figures; but, in general, they ſomewhat reſemble a muſſel, except that their ſhell is compoſed of five or more pieces, the ſmaller ſerving to cloſe the openings left by the irregular meeting of the two principal.

This animal, when diveſted of its ſhell, is roundiſh and ſoft, with two teeth, but placed ſo as to be incapable of touching the hollow ſurface of its ſtony dwelling. It has two covers to its ſhell, that open and ſhut at either end; but the inſtrument with which it performs its operations, and buries itſelf in the hardeſt rocks, is a broad fleſhy ſubſtance, ſomewhat reſembling a tongue, iſſuing from the bottom of its ſhell. With this ſoft yielding inſtrument, it perforates the moſt ſolid marbles: and having, while yet little and young, made its way by a very narrow entrance into the ſubſtance of the ſtone, when it begins to grow bigger, it enlarges the apartment. By ſlow ſucceſſive applications, it effects what other animals are incapable of performing by force; ſuch is the power of perſevering patience. While yet naked and very ſmall, it has effected an entrance, and buried its body in the ſtone: it there continues for life at its eaſe. The ſea-water that enters the aperture ſupplying it with plenty, it quickly grows larger, and finds a neceſſity of enlarging its habitation and its ſhell; in proportion as it becomes larger, it makes its way farther into the rock: when it has got a certain way in, it hollows downward, till its habitation, when completed, reſembles the bowl of a tobacco-pipe; the hole in the ſhank being that by which the animal entered. Thus immured, the Pholas lives in darkneſs, indolence, and plenty,

plenty, never removing from its narrow manſion; the ſea-water that enters by its little gallery ſatisfies its wants, and, without any other food, it grows from ſeven to eight inches long, and thick in proportion. Their ſhell grows on them in the body of the rock. Theſe ſhells take different forms, and are compoſed of a different number of valves, from three to twelve; ſometimes the ſhell reſembles a tube, with a hole at each end, one for the mouth, and the other for voiding the excrements. Many often meet in the heart of the rock, and frequently break in on each other's retreats. Whether by accident, or of choice, cannot be determined; they are moſt commonly found in numbers in the ſame rock; and ſometimes above twenty within a few inches of each other.

SURVEYS OF NATURE.

PART THE SIXTH.

INSECTS.

INSECTS are a ſubject almoſt inexhauſtible from numbers and variety. "After an attentive examination," ſays Swammerdam, "of the nature and anatomy of the ſmalleſt as well as the largeſt animals, I cannot help allowing the leaſt an equal, or perhaps a ſuperior, degree of dignity. If, while we diſſect with care the larger animals, we are filled with wonder at the elegant diſpoſition of their parts, to what an height is our aſtoniſhment raiſed, when we diſcover all theſe parts arranged in the leaſt in the ſame regular manner!" Yet the inſect tribe deſerve but the laſt and loweſt rank in animated nature; they ſeem all the moſt imperfectly formed; many of them can live a long time, though deprived of organs neceſſary to life in higher ranks of nature. They are too often, among ourſelves, unwelcome intruders on the fruits of human induſtry; but in leſs cultivated regions, their annoyance and devaſtations are terrible. Witneſs Lapland and America, where, if a candle be lighted, the inſect ſwarm inſtantly extinguiſhes it with their numbers; where the inhabitants are obliged to ſmear their bodies and faces with tar, or greaſe, to protect them from the puncture of their minute enemies; where, though millions are deſtroyed, famiſhed millions ſtill ſucceed to make the torture endleſs!

Through all nature, nobler animals are ſlowly produced, while meaner births are laviſhed in profuſion. Of all productions in nature, inſects are the moſt numerous. On minute inſpection, we ſhall find every plant ſupporting

ſupporting a number of ſcarce perceptible creatures, that fill up the various ſtages of youth, vigour, and age, in the compaſs of a few days exiſtence. Inſects have but one invariable method of operating; no arts can turn their inſtincts; and generally their life is too ſhort for inſtruction, as a ſingle ſeaſon often terminates it. Many are attached to one vegetable, or a ſingle leaf; they increaſe with the flouriſhing plant, and die as it decays; a few days fill up the meaſure of their lives: the ends of their production, or its pleaſures, are utterly unknown to us.

Inſects are little animals without red blood, bones or cartilages, furniſhed with a trunk, or elſe a mouth, opening lengthwiſe, with eyes which they are incapable of covering, and with lungs which have their openings on the ſides. Almoſt every ſpecies has its diſtinct hiſtory, and exhibits manners and appetites peculiarly its own; generally prolific beyond computation, and multiplied beyond deſcription.

To enumerate every ſpecies of flies, or moths, would be fruitleſs; to give an hiſtory, utterly impracticable. Mr. Ray thought there could not be leſs than twenty thouſand kinds; and one gentleman of my acquaintance, himſelf, caught eight hundred in one ſeaſon in England; yet poſſeſſed very far from a majority of our natural tribes. When rouſed from their ſtate of annual torpidity, and beginning to feel the genial influence of ſpring, they exhibit new life in every part of nature.

By ſelecting ſome ſimilitudes in propagation, manners, or form, we derive a hint for grouping ſeveral in one deſcription, and thus ſhorten the labour of their hiſtory. The firſt that offer are thoſe without wings, crawling on every plant and ſpot of earth. Of theſe, ſome never obtain wings; others only wait their growing wings, to arrive at perfection.

The former may be conſidered as the *firſt* claſs of inſects. All theſe, the flea and the wood-louſe excepted, are produced from an egg, and ſuffer no further change of form, but continue to grow larger till they die.

The ſecond order, when produced from the egg, have their wings caſed up ſo as not to appear. This, however, does not prevent the animal's running, leaping, and moving with celerity; but when the caſe burſts, and the wings expand, all its motions become more extenſive and perfect.

The third order of inſects is the moth and butterfly kind. Theſe have four wings, covered with a mealy ſubſtance of various colours, which when handled comes off on the fingers; and, if examined by the microſcope, appears like ſcales or feathers, with which the wing is nicely embroidered. They are firſt hatched from an egg, in the form of a caterpillar

pillar that eats, and often caſts its ſkin, of which when diveſted for the laſt time, it aſſumes a new covering, called a chryſalis (or the cone in the ſilk-worm), in which it continues hidden till it comes forth a perfect moth or butterfly.

The fourth order is thoſe winged inſects which come from a worm, not a caterpillar, yet go through changes ſimilar to thoſe of moths and butterflies. They quit the egg as a worm, then become a chryſalis; in ſome, their wings and legs are ſeen; in others, the animal is detached from the cone which conceals it; but all break their priſon, and come out perfect winged animals; ſome with two wings, ſome with four. The wings of theſe differ from thoſe of the butterfly and moth kind, by not having mealy ſcales. In this claſs we may place the numerous tribes of gnats, beetles, bees, and flies.

After Inſects follow a numerous tribe, that may be propagated by diſſection. Some, though cut into an hundred parts, retain ſuch life in each, that every part ſhortly becomes a perfect animal. They ſeem placed between animals and vegetables, and to connect animated and inſenſible nature. To this claſs belong the earth-worm, the ſea-nettle, and the polypus. Theſe are not properly inſects; but ſeem with propriety to follow them, in the general order of nature.

WINGLESS INSECTS.

IN general, all animals reſembling the flea, the louſe, the ſpider, the bug, the wood-louſe, the water-louſe, and the ſcorpion, never acquire wings, but are produced from the egg in that form which they never change.

This claſs is, in general, longer lived than others, often continuing their term beyond one ſeaſon, which is the ordinary period of inſect exiſtence. They ſeem alſo leſs ſubject to the influence of the weather, and often endure winter without torpidity. Sometimes the young burſt the ſhell within the parent's body, and are brought forth alive. This is not unfrequent with the wood-louſe, and others, which ſometimes produce eggs, ſometimes young perfectly formed.

Theſe creatures often, during their exiſtence, change their ſkin, in common with many animals. Their ſkins, if compared to their ſtrength

and ſize, reſemble the ſhell of a lobſter, and adequately defend them from injuries, particularly from the attacks of each other. Within this they grow, till their ſize exceeds that of their covering, then it burſts, and they acquire one more proportionate. Their ſtrength is, for their ſize, almoſt beyond credibility. A flea will draw a chain an hundred times heavier than itſelf, as it will alſo eat ten times its own ſize of proviſion in a day.

THE SPIDER.

FORMED for rapacity, and living only on inſect food, all its habits are calculated to deceive and ſurpriſe; it ſpreads toils to entangle its prey; is endued with patience to await its coming; and has arms and ſtrength to deſtroy it when enſnared.

The houſe-ſpider, which weaves its web in neglected rooms; the garden-ſpider, that ſpreads its toils from tree to tree, and reſts in the centre; the wandering-ſpider, that has no ſettled abode; and the field-ſpider, that is ſometimes ſeen mounting, web and all, into the clouds, are the chief of our native ſpiders, and, though reputed venomous, are inoffenſive. But in Africa and America, in regions where all inſects acquire their greateſt growth, where the butterfly expands a wing like our ſparrow's, and the ant builds habitations as tall as a man, their ſpiders bear a proportionable magnitude. The Martinico ſpider's body equals a hen's egg, and is covered with hair. Its web is ſtrong, and its bite dangerous.

Spiders have two diviſions in the body. The fore part, containing the head and breaſt, ſeparated from the hinder part or belly by a ſlender thread, through which is a communication from one part to the other. The fore part is covered with a hard ſhell, as alſo the legs, which unite to the breaſt. The hinder part has a ſupple ſkin, beſet with hair. They have ſeveral eyes round the head, brilliant and acute, ſometimes eight, ſometimes ſix; two behind, two before, the reſt on each ſide. Their eyes are immoveable, and want eye-lids. They have two pincers on the fore part of the head, rough, with ſtrong points, toothed like a ſaw, and terminating in claws; near the point of the claw, a ſmall hole emits a poiſon,

poiſon, harmleſs to us, yet capable of inſtantly deſtroying its prey. This is their moſt powerful weapon; they can open theſe pincers as occaſion requires; when undiſturbed, they lie one upon the other. They have eight legs, jointed like thoſe of lobſters: if a leg be torn away, or a joint cut off, a new one will quickly grow in its place. At the end of each leg are three crooked moveable claws; a ſmall one, placed high up like a cock's ſpur, by which it adheres to the threads of its web; and two others, larger, which meet like a lobſter's claw, with which they can hold by the ſmalleſt depreſſions of very poliſhed ſurfaces imperceptible to us. But when they walk on bodies perfectly ſmooth, as looking-glaſs or poliſhed marble, they ſqueeze a little ſponge, placed near the extremity of their claws, and diffuſing a glutinous ſubſtance, adhere to the ſurface. They have two other legs, or rather arms, uſed in holding and managing their prey.

The ſpider's web is generally laid where flies are moſt apt to come and ſhelter; in the corners of rooms, round the edges of windows, in the open air among the branches of trees: here the ſpider remains days or weeks together, in patient expectation, ſeldom changing its ſituation, though never ſo unſucceſsful. To make the web, nature has given this animal a large quantity of glutinous matter within its body, and five dugs or teats for ſpinning it into thread. This ſubſtance is contained in a little bag, and at firſt ſight reſembles ſoft glue; examined more accurately, it appears twiſted into many coils of an agate colour; on breaking it, the contents may be eaſily drawn out into threads, from the tenacity of the ſubſtance, not from threads being already formed. The threads which we ſee, and appear ſo fine, are compoſed of five joined together, and theſe many times doubled to form the web.

When a HOUSE-SPIDER begins a web, having choſen ſome commodious ſpot, it diſtils one little drop of its glutinous liquor, which is very tenacious; then creeping up the wall, and joining its thread as it proceeds, it darts itſelf in a very ſurpriſing manner to an oppoſite point, where the other end of the web is to be faſtened; this thread drawn tight and fixed, the ſpider runs on it backward and forward, aſſiduouſly doubling and ſtrengthening it. The ſpider makes a number of threads parallel to the firſt, and croſſes them with others, the clammy ſubſtance of which they are formed binding them, when newly made, to each other. The inſect after this doubles and trebles the thread that borders its web, and ſecures the edges. The retreat is next attended to; this is formed like a funnel, at the bottom of the web, for concealment, having two paſſages,

or outlets, one above, the other below; contrived to permit excurſions, at proper ſeaſons, for prying into every corner, and cleaning parts which are clogged or encumbered. Ever attentive to its web, the ſpider, from time to time, cleans away duſt that gathers round it, giving the whole a ſhake with its paws; but not to endanger the fabric. Whenever this web is touched, the ſpider prepares for attack or defence. If the inſect impinging be a fly, it ſprings forward with great agility; if it be an enemy ſtronger than itſelf, it keeps within its fortreſs till the danger be over. This retreat alſo ſerves for a place where the creature can feaſt upon its game in ſafety. Often the labours of an age are deſtroyed in a minute, and the ſpider is obliged to remain ſpectator of univerſal ruin. Of the glutinous ſubſtance of which the web is made, in this calamity, it either makes a new web, or patches up the old one. There is originally but a certain quantity of this matter, which, when exhauſted, nothing can renew. When this reſervoir is dried up, the animal is left to the chances of neceſſity. An old ſpider is thus frequently reduced to the greateſt extremity; it hunts about for the web of another, younger and weaker, which is driven out to make a new web, and the old one remains in poſſeſſion of its labours. If unable to acquire a web, it endeavours for a while to ſubſiſt on accidental depredation; but in two or three months inevitably dies of hunger.

The GARDEN-SPIDER ſpins a great quantity of thread, which floating in the air in various directions, from its glutinous quality, at laſt ſticks to ſome object, a lofty plant or the branch of a tree. The ſpider draws the line thus fixed, and paſſing and repaſſing on it, ſtrengthens the thread. From the firſt cord the ſpider faſtens another, dropping from thence to ſome ſolid body below, then climbs up again and begins a third, which it faſtens by the ſame contrivance, and ſo on. When the young ſpider begins ſpinning, its web is buoyant, and not only the thread floats in the air, but the little ſpinſter is ſupported by its buoyancy.

A ſpider ſometimes remains weeks or months watching without catching a ſingle fly, and is ſurpriſingly patient of hunger. The butterfly, or the hornet, when they touch the web, fly off again, and the ſpider ſeems not diſpleaſed at their retreat. The large blue-bottle-fly, the ichneumon-fly, and the common meat-fly, ſeem to be its favourite game. When one of theſe ſtrikes into the toils, the ſpider is inſtantly ſeen alert and watchful at the mouth of its hole, obſerving whether the fly be completely immeſhed. If he be, the ſpider walks leiſurely forward, ſeizes its prey, and inſtantly kills it by inſtilling a venomous juice into the wound.

If the fly be not entirely immeſhed, the ſpider waits, without appearing, till its prey has fatigued itſelf by its ſtruggles. If the ſpider has faſted long, it drags the fly to its hole and devours it; but if not preſſed by hunger, it gives the fly two or three turns in its web, completely to immeſh it, and there leaves it for a future feaſt.

The males are much leſs than the females; having parts of generation placed in the fore arms, as if burſting out from the points of his fore feet. Their receptacle is beneath the body of the female. She generally lays from nine hundred to a thouſand eggs in a ſeaſon; blueiſh, ſpeckled with black, ſeparated from each other by a glutinous ſubſtance, not unlike frog-ſpawn water. Some are as large as a grain of muſtard-ſeed; others ſcarcely viſible. She never lays till two years old. When her eggs have remained an hour or two to dry, ſhe prepares them a bag by ſpinning a web four or five times ſtronger than that for catching flies, and lined within by a down from her breaſt. This bag is as thick as paper, ſmooth within, rough without. Within this they depoſit their eggs. They ſtick it by the glutinous fluid to the end of their body; ſo that the animal appears as if ſhe had one body behind another. If this bag be ſeparated from her, ſhe employs all her aſſiduity to ſtick it again in its former ſituation, and ſeldom abandons her treaſure but with her life. When the young are excluded from their ſhells, within the bag, they remain ſome time in their confinement, till the female, inſtinctively knowing their maturity, bites open their priſon, and ſets them free. She receives them on her back for ſome time, until they have ſtrength to provide for themſelves. They begin to ſpin when ſcarce diſcernible, and to prepare for a life of plunder. They are able to deſtroy animals ten times bigger than themſelves, and they quickly recover of wounds.

Spiders are enemies of each other; they are of ſuch a malignant nature, they cannot live in ſociety, but, inſtead of their food, devour each other.

Of this animal are ſeveral kinds, ſlightly differing from each other, either in habits or conformation. The WATER-SPIDER is the moſt remarkable. This inſect reſembles the common ſpider, except that its hinder part is rather the ſhape of a nine-pin than a ball. They differ, by living both by land and water, and ſpinning in both elements. Their appearance under water is remarkable; they inhabit the bottom, yet are never touched by the element in which they reſide, but are encloſed in a bubble of air that ſurrounds them. This bubble has the bright appearance of quickſilver; within this they continue eating, ſpinning, and ſleeping,

ſleeping, without its burſting, or diſturbing their operations: ſometimes the bubble is divided into three apartments, and in the ſpring the male enters one of thoſe to the female; the bubble in which he was contained unites with the other, like two drops of water, when cloſely approached. They ſpin their webs as well in the water as on land; and moſt probably they feed on the ſmall inſects of both elements.

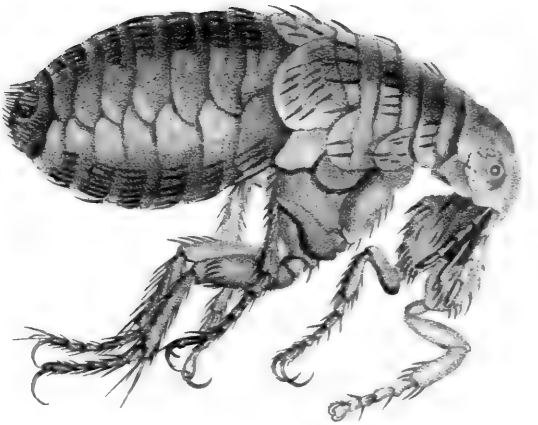
The celebrated TARANTULA deſerves notice as the largeſt of the ſpider kind known in Europe. Is native of Apuleia in Italy; its body three quarters of an inch long, about as thick as one's little finger; colour generally olive-brown, variegated duſky; has eight legs and eight eyes; nippers, ſharp and ſerrated: between theſe and the fore legs are two little horns, or feelers, which it moves very briſkly when approaching its prey. It is covered all over the body with a ſoft down; and propagates by laying eggs. In the ſummer months, particularly in the dog-days, the tarantula creeping among the corn, bites the mowers and paſſengers; but in winter it lurks in holes, and is ſeldom ſeen. Though the bite is attended with no *dagnerous* ſymptoms, and will eaſily cure of itſelf, wonderful ſtories are reported concerning its virulence, which has been ſaid to yield only to the influence of muſic and dancing. Some have thought ſuch exerciſe might promote perſpiration, and ſo the cure; while others inſiſt the diſeaſe requires no curing, being in reality nothing more than a *craving* for the contributions uſually levied on paſſengers or bye-ſtanders who happen to be preſent.

THE FLEA.

THIS inſect, the enemy of mankind, alſo of the dog, cat, and ſeveral other animals, is found in every part of the world, but bites with greater ſeverity in ſome countries than in others. Its numbers in Italy and France are much greater than in England.

It has a ſmall head, large eyes, and a roundiſh body. It has two feelers, or horns, ſhort, compoſed of four joints; between theſe lies its trunk, which it buries in the ſkin, and through which it ſucks blood. The body is covered with a ſuit of poliſhed armour neatly jointed, beſet with many ſharp prickles. It has ſix legs, whoſe joints are ſo adapted, that it can,

as



The Flea.

magnified

as it were, fold them up one within another; in leaping, they all ſpring at once, whereby its whole ſtrength is exerted, and the body raiſed above two hundred times it own diameter.

Fleas are at firſt a ſort of nits or eggs, round and ſmooth; from theſe proceed white worms, of a ſhining pearl colour: in a fortnight they are a tolerable ſize, very lively and active. If touched, they roll themſelves up in a ball; ſoon after they begin to creep, and ſeek a place to lie hid in, where they ſpin a ſilken thread from their mouth, and with this incloſe themſelves in a ſmall round bag or caſe, white within, but dirty without: here they continue a fortnight, and burſt from this confinement perfectly formed.

THE LOUSE.

IN examining the human louſe with the microſcope, its deformity ſtrikes us with diſguſt: the fore-part of the head is oblong, the hind-part ſomewhat round; the ſkin hard, and, being ſtretched, tranſparent, with here and there ſeveral briſtly hairs; in the fore-part is a proboſcis or ſucker; on each ſide the head are antennæ, or horns, each divided into five joints, covered with briſtly hair; and ſeveral white veſſels are ſeen through theſe horns; behind theſe are the eyes, which ſeem to want thoſe diviſions obſervable in other inſects, and appear encompaſſed with ſome few hairs; the neck is very ſhort, the breaſt divided into three parts; on each ſide are ſix legs, conſiſting of ſix joints, covered with briſtly hairs; the ends of the legs are armed with two ſmaller and larger ruddy claws, ſerving thoſe inſects as a finger and thumb, by which they catch hold of objects; the end of the body terminates in a cloven tail; the ſides are all over hairy; the whole reſembling clear parchment, and, when roughly preſſed, cracking with a noiſe. On a cloſer view, its white veins, and other internal parts, appear; as likewiſe a moſt wonderful motion in its inteſtines, from the tranſparency of its external covering. When the louſe feeds, the blood is ſeen to ruſh, like a torrent, into the ſtomach; and its greedineſs is ſo great, that the excrements contained in the inteſtines are ejected at the ſame time, to make room for this new ſupply. The louſe has neither beak, teeth, nor mouth, as Dr. Hooke

deſcribed it, but a proboſcis or trunk, or pointed hollow ſucker, with which it pierces the ſkin, and ſucks the blood only. The ſtomach is lodged partly in the breaſt and back; but moſt of it in the abdomen. When ſwollen with blood, it appears dark brown, viſible through the ſkin; and is either a faint red, or a full or bright brown, as the contents of the ſtomach are more or leſs changed. When it is empty, it is colourleſs; but when filled it is plainly diſcernible, and its motion very extraordinary, working with very ſtrong agitations, the old aliment mixing with the new. If kept faſting two or three days, and placed on the back of the hand, it will immediately ſeek for food; the more readily, if the hand be rubbed till it grows red. The animal then turns its head to the ſkin, and diligently ſearches for ſome pore; when found, it fixes the trunk therein, and ſoon the microſcope diſcovers the blood aſcending through the head, in a very rapid, and even frightful ſtream. The louſe has at that time ſufficient appetite to feed in any poſture; it is then ſeen ſucking with its head downward, and its tail elevated. If, during this operation, the ſkin be drawn tight, the trunk is bound faſt, and the animal is incapable of diſengaging itſelf; but it more frequently ſuffers from its gluttony, ſince it gorges to ſuch a degree, that it is cruſhed to pieces by the ſlighteſt impreſſion.

Swammerdam is inclined to think them hermaphrodites, having found an ovary in not leſs than forty-two. In one were found ten large eggs, and forty-four ſmaller. Scarce any animal multiplies ſo faſt as this unwelcome intruder. The moment the nit gets rid of its ſuperfluous moiſture, and throws off its ſhell, it begins to breed in turn. Nothing ſo much prevents their increaſe as cold dryneſs: the nits muſt be laid warm and moderately moiſt to produce any thing. Linnæus is of opinion, that the head and the body louſe differ in no reſpect from each other. They ſeldom attack any in our climate, but ſuch as from ſloth or famine invite their company.

It would be endleſs to deſcribe the various tribes, under this name, that ſwarm on every part of nature; ſcarce an animal, or vegetable, that does not ſuffer from its own peculiar louſe. The ſheep, the horſe, the hog, and the elephant; the whale, the ſhark, the ſalmon, and the lobſter; every hot-houſe and every garden is infeſted with ſome. Linnæus once found a vegetable louſe on ſome plants newly arrived from America: willing to trace the little animal through its various ſtages, he brought it with him from London to Leyden, where it became the parent of ſo numerous a progeny, that it ſoon over-run all the phyſic-garden of that beautiful city.

That

That which ſome have called the LEAF-LOUSE, is the ſize of a flea; bright green, or blueiſh green colour; the body nearly oval, largeſt and moſt convex on the hinder part; the breaſt very ſmall, the head blunt and green; the eyes are prominent on the fore-part of the head, of a ſhining black; near theſe, is a black line on each ſide; the legs are very ſlender. Theſe are uſually found on the leaves of the orache, and other plants; and the weaker the leaves and buds, theſe inſects ſwarm in greater abundance. Some plants are covered over with them. They do not cauſe the plant's weakneſs, but by wounding and ſucking the leaf they increaſe the diſeaſe. They generally aſſume their colour from the plant on which they reſide. Thoſe on pot-herbs and plum-trees, are aſh-coloured, but greeniſh when young; thoſe of the alder and cherry trees are black, alſo thoſe on beans and ſome other plants; thoſe on the leaves of apples and roſe-trees, are white: as theſe leap like graſshoppers, ſome place them in the number of the flea kind. The moſt uncommon colour is reddiſh, and this ſort is found on the leaves of tanſey; and their juice, when rubbed on the hands, tinges them red. All theſe live on their reſpective plant, and are often engendered within the very ſubſtance of the leaf.

Theſe bring forth their young alive; their fore-parts being excluded firſt. Its proviſion lying beneath it, during ſummer it eats and creeps with great agility: for winter it endeavours to ſecure a retreat near trees or plants that nouriſh it in ſpring. They never hide in the earth, becauſe they have no part fitted to remove earth; nor can they creep into every chink, as their legs are long, and their bodies ſo tender, the leaſt rough particle of earth would hurt them; but they get into the deep chinks of the bark, and the cavities of ſtronger ſtalks. As neither the temperature of autumn nor ſpring hurts them, they ſeldom ſeek hiding-places before the fall of the leaf, and take the earlieſt advantage of returning warmth. They caſt their ſkins four times; the males have four wings, the females none. They have long legs, to creep over the long hairs of plants and leaves, or to travel from tree to tree when diſtant. Their trunk or ſnout lies under the breaſt; this they thruſt into the pores of the plant, and ſuck out the juice; but ſo hurt the leaves by ſucking, that they become ſpotted and ſcabbed, their edges always turning up. The leaf-louſe is more than a match for the ant at ſingle combat. When they perceive the ant approaching behind them, they kick back with their hinder feet, and drive off the invader, as a horſe would a lion.

The three principal and conſtant enemies to theſe inſects are, firſt, the

fire-fly, which lays its eggs where theſe inſects are in greateſt number, which produce worms, that ſeize and devour all the leaf-lice that come near: another enemy is the worm of a peculiar kind of beetle, which deſtroys them in great numbers; but the moſt formidable is the ichneumon fly, that ſeizes one of the largeſt females, and lays its egg on her; this is hatched into a worm, which ſoon devours and deſtroys the animal from whoſe body it ſprung.

THE BUG

CONTRIVES its habitation with much art, ſeems to avoid the light with great cunning, and if candles be kept burning will not iſſue from its hiding place; but when darkneſs promiſes ſecurity, it iſſues from every corner, drops from the teſter, crawls from behind the arras, and travels with great aſſiduity to the unhappy patient, who vainly wiſhes for reſt and refreſhment. Not leſs diſagreeable from their nauſeous ſtench, than their unceaſing appetites: when they crawl, the whole bed is infected; but, if accidentally killed, it is inſupportable. In Great-Britain they multiply leſs than on the Continent. In France and Italy the beds, particularly in their inns, ſwarm with them, as doth every piece of furniture. They grow larger alſo, and bite more cruelly.

This animal conſiſts of three principal parts; the head, the corſelet, and the belly; has two brown eyes, very ſmall, and a little prominent; and two feelers, with three joints: underneath theſe is a crooked trunk, which lies cloſe on the breaſt. The breaſt is a kind of ring, in which are the two firſt pair of legs. The belly conſiſts of nine rings, under which are two pair of legs more. Each leg has three joints, forming the thigh, leg, and foot, which is armed with a crooked claw, like a hook. The body is ſmooth, except a few ſhort hairs about the vent, and on the two laſt rings. Its motion is ſlow and unwieldy; but its ſight exquiſite. This inſect internally has the great artery, which as in all inſects performs the functions of the heart; apertures of the lungs on the right ſide and left, through which it breathes; a ſtomach and inteſtines.

The male and female are plainly diſtinguiſhable. The female has an ovary filled with eggs, joined together like a bunch of grapes; each egg being

being oblong, almoſt cylindrical, inclining to white, and pretty tranſparent. In about two days after impregnation, ſhe depoſits about an hundred and fifty eggs; they continue ſome months; during which time, neither cold nor heat, moiſture nor fumigation, can in the leaſt retard their excluſion. It is this hardineſs in the ſhell that ſeems to continue the breed; as the old ones die every winter, or are eaſily deſtroyed by fumigation. Cleanlineſs is the beſt antidote to theſe nauſeous inſects. They are ſometimes found in ſuch numbers among old furniture, and neglected chambers, expoſed to the ſouth, that, wanting other ſuſtenance, they devour each other. They are alſo enemies to other vermin, and deſtroy fleas very effectually.

Of the bug kind Linnæus reckons forty.

THE WOOD-LOUSE

IS ſeldom above half an inch long, and a quarter of an inch broad; colour livid black, when found about dunghills and on the ground; but thoſe under tiles, and in drier places, are of a dun colour. It has fourteen feet, ſeven on each ſide; only one joint each, which is ſcarcely perceivable. It has two ſhort feelers; the body is oval. When touched, it rolls itſelf into a ſort of ball; the ſides, near the feet, are dentated; found among rotten timber and decayed trees: in winter, lies hid in crevices of walls and buildings. The male is diſtinguiſhable from the female, being leſs, and more ſlender; her eggs are white and ſhining like ſeed pearls, and very numerous: properly ſpeaking, although the young when excluded have the appearance of an egg, yet they are alive, and, without throwing off any ſhell, ſtir and move about; ſo that this animal may properly be ſaid to be viviparous. The little worms at firſt ſeem ſcarce able to ſtir; but ſoon feed, and become very briſk. Theſe animals are of great uſe in medicine; being impregnated with a ſaline quality, which is diuretic and ſtimulating.

Of this inſect Linnæus makes three ſpecies.

THE

THE MONOCULUS, OR ARBORESCENT WATER-FLEA,

IS the ſize of a flea; appears to the ſight to have but one eye; for, by the ſmallneſs of the head, the eyes ſeem joined to each other: they are ſituated in the trunk, and appear, by the microſcope, to be reticulated, or net-like; the trunk is not only ſmall and ſharp, but tranſparent. The inſects are blood-red; ſometimes in ſuch multitudes on the ſurface of ſtanding water, as to make it appear red; whence fanciful people have thought the water to be turned into blood.

This animal's branching arms, and their motion in the water, deſerve attention. By theſe it can move in a ſtraight line; waving them, as a bird its wings, ſometimes upward, ſometimes downward, ſometimes to the right, ſometimes to the left. By ſtriking the water with theſe, it aſcends with great velocity; by ſtriking in a contrary direction, it dives with equal eaſe. As theſe motions are very rapid, the little animal appears to jump in the water, its head always tending to the ſurface, and its tail ſtretched downward. This inſect is produced from an egg, which, when exclued, is carried on the back of the female, and ſoon is ſeen floating in the water round her. Its appearance at firſt is that of a very ſmall whitiſh inſect, endued with a very nimble motion. Except in colour, it ſuffers no change, only continuing to grow larger and redder, as it grows old. They ſometimes remain ſeveral days on the ſurface of the water; and ſometimes are ſeen at the bottom only; but never at reſt. They change their ſkin, like moſt other inſects; and the caſt ſkin reſembles the inſect itſelf ſo exactly, that one might miſtake the maſk for the animal.

THE SCORPION,

WHOSE ſhape is hideous, whoſe ſize enormous, and whoſe ſting fatal, is entirely a ſtranger among us. In ſeveral parts of the Continent of Europe it is but too well known, though ſeldom above four inches long: in the tropical climates, it is ſeen a foot in length, and in ſize equals a lobſter. It is alſo more eminently poiſonous and fatal.

The Scorpion

Not leſs terrible from its ſize than its malignity. It reſembles a lobſter ſomewhat in ſhape. There are counted nine kinds of this dangerous inſect, chiefly diſtinguiſhed by their colour; yellow, brown, and aſh-coloured, ruſt-coloured, green, pale yellow, black, claret-colour, white, and grey.

There are four principal parts diſtinguiſhable in this animal; the head, the breaſt, the belly, and the tail. The ſcorpion's head ſeems jointed to the breaſt; in the middle of which are two eyes; and a little forwarder two more, placed in the fore part of the head, ſo ſmall, they are ſcarcely perceivable. The mouth has two jaws; the undermoſt divided, and the parts notched into each other, which ſerve as teeth; theſe can, at pleaſure, be withdrawn into its mouth, ſo that no part can be ſeen. On each ſide the head are two arms, each compoſed of four joints; the laſt large, with ſtrong muſcles, and like a lobſter's claw. Below the breaſt are eight articulated legs, each divided into ſix joints, having two crooked claws, and here and there covered with hair. The belly is divided into ſeven little rings; from the loweſt of which is continued a tail, compoſed of ſix joints, briſtly; the laſt armed with a crooked ſting, long, pointed, hard, and hollow; pierced near the baſe by two ſmall holes, through which the animal ejects a drop of poiſon, white, cauſtic, and fatal. The reſervoir of this poiſon is a ſmall bladder near the tail, into which the venom is diſtilled by a peculiar apparatus. If this bladder be gently preſſed, the venom will be ſeen iſſuing out through the two holes above-mentioned.

Few animals are more formidable, or more truly miſchievous. As it takes refuge in ſmall places, and generally in houſes; it muſt almoſt inevitably ſting ſome among whom it reſides. In ſome parts of Italy and France, in the province of Languedoc, it is one of the greateſt peſts; but its malignity in Europe is trifling, when compared to thoſe of Africa and the Eaſt. In Batavia they grow twelve inches long; there is no removing any furniture without the utmoſt danger. Along the Gold Coaſt they are equally large, and their ſting fatal.

No animal in the creation ſeems endued with ſuch an iraſcible nature. When taken, they exert their rage againſt the ſides of the glaſs veſſel containing them. They will attempt to ſting a ſtick when put near them; and attack a mouſe or a frog, while thoſe animals were far from offering any injury. Maupertuis put three ſcorpions and a mouſe into the ſame veſſel together, and they ſoon ſtung the little animal in different places. The mouſe ſtood for ſome time on the defenſive, and at laſt

killed them all, one after another. He tried this experiment in order to ſee whether the mouſe, after it had killed, would eat the ſcorpions; but the little quadrupede ſeemed entirely ſatisfied with the victory, and even ſurvived the ſeverity of its wounds. Wolkamer tried the courage of the ſcorpion againſt the large ſpider, which at firſt uſed all its efforts to immeſh the ſcorpion in its web, which it immediately began ſpinning; but the ſcorpion reſcued itſelf from the danger, by ſtinging its adverſary to death: it ſoon after cut off, with its claws, all the legs of the ſpider, and then ſucked all the internal parts at its leiſure.

The fierce ſpirit of this animal is equally dangerous to its own ſpecies. Maupertuis put an hundred of them together in the ſame glaſs; and they ſcarce came into contact, when they began to exert all their rage in mutual deſtruction: there was nothing to be ſeen but one univerſal carnage, without diſtinction of age or ſex; ſo that, in a few days, there remained only fourteen, which had killed and devoured all the reſt. When driven to extremity, the ſcorpion will deſtroy itſelf. If placed amidſt a circle of burning charcoal, and thus an egreſs prevented on every ſide, the ſcorpion runs round the circle in hopes of eſcaping; but finding that impoſſible, ſtings itſelf on the back of the head, and inſtantly expires.

The male and female are eaſily diſtinguiſhable; the male being ſmaller and leſs hairy. The female brings forth her young alive and perfect, thirty or forty at a time. How long they live we are not told; but probably ſeven or eight years; and the larger kind double that duration. They caſt their ſhell, or ſkin, which is ſofter by far than the lobſter's, and ſet with hairs in abundance, particularly at the joinings. The young lie in the parent, each covered up in its own membrane, and united to each other by an oblong thread, in the form of a chaplet.

There is an American ſcorpion, produced from eggs no larger than pins points, and depoſited in a web, which they ſpin from their bodies, and carry about with them till they are hatched. As ſoon as the young are excluded from the ſhell, they get on the back of the parent, who turns her tail over them, and defends them with her ſting.

THE

THE SCOLOPENDRA AND GALLY-WORM.

THE SCOLOPENDRA, or CENTIPES, having many feet, is very common in many parts of the world, eſpecially between the tropics. In the Eaſt-Indies they grow to ſix inches long (ours are but one inch), of a ruddy colour, as thick as a man's finger: they conſiſt of many joints, and from each joint a leg on each ſide: they are hairy, and ſeem to have no eyes, but two feelers on the head, by which they find out their way. The head is very round, with two ſmall ſharp teeth, with which they inflict wounds that are very painful and dangerous. Of this animal there are different kinds; ſome living, like worms, in holes in the earth; others under ſtones and among rotten wood; ſo that nothing is more dangerous than removing thoſe ſubſtances, in places where they breed.

The GALLY-WORM differs from the Scolopendra in having double the number of feet, there being two on each ſide to every joint of the body. Some are ſmooth, and others hairy; ſome yellow, ſome black, and ſome brown. Are found among decayed trees, between the wood and the bark; alſo among ſtones covered with moſs. When touched, contract themſelves, rolling themſelves up like a ball. Whatever be their qualities in the tropical parts of the world, in Europe they are perfectly harmleſs. Theſe are ſuppoſed to be produced perfect from the parent or the egg. They are ſeen of all ſizes; and this is ſufficient inducement to ſuppoſe that they preſerve their firſt appearance. It is probable, however, that, like moſt of this claſs, they often change their ſkins; but of this we have no certain information.

THE

SECOND ORDER OF INSECTS.

TO this we refer the Libella, or Dragon-Fly; the Formica-Leo, or Lion-Ant; the Graſshopper; the Locuſt; the Cricket; the Wood-Cricket; the Mole-Cricket; the Flea-Locuſt; the Flying-Bug; the Tipula; the Water-Scorpion; the Notonecta, or Water-Fly; and many others, produced by eggs, but without wings, which they afterwards acquire.

THE LIBELLA, OR DRAGON-FLY,

IS, of all the flies which diverſify Nature, the moſt various and moſt beautiful; of all colours; green, blue, crimſon, ſcarlet, white; ſome unite variety of moſt vivid tints, in different ſhades. They are called, in different parts, by different names. They are diſtinguiſhed from all other flies by the length of their bodies, the largeneſs of their eyes, and the beautiful tranſparency of their wings, which are four. In ſummer they fly rapidly near every hedge, and by every running brook; they ſometimes ſettle on the leaves of plants, and ſometimes keep hours together on the wing.

Though there are three or four different kinds, yet they agree in the moſt ſtriking parts of their hiſtory. The largeſt are from two to four inches long; their tail forked; their body divided into eleven rings; their eyes large, horny, tranſparent, net-like; their wings, that always lie flat when at reſt, of a beautiful gloſſy tranſparency, ſometimes ſhining like ſilver or gold. Within the mouth are two teeth, covered with a beautiful lip: with theſe the creatures bite fiercely when taken; but their bite is harmleſs.

They are produced from eggs, depoſited in the water, where they remain ſome time without life or motion. They are ejected by the female into the water in cluſters, like a bunch of grapes, where they ſink to the bottom,

bottom, and continue till the young find ſtrength enough to break the ſhell, and to ſeparate from each other. They firſt ſhew life as a worm, with ſix legs, bearing a ſtrong reſemblance to the dragon-fly in its winged ſtate, except that the wings are yet concealed within a ſheath. Their rudiments appear in bunches on the back, within which the wings are folded up into each other, while all the colours and varieties of painting appear through the ſkin. On quitting the egg, they ſtill continue in the water, where they creep and ſwim, but not ſwiftly. They have a ſharp ſight, and ſink to the bottom whenever they perceive unuſual objects. Their food is ſoft mud, and the glutinous earthy ſubſtances at the bottom.

When they prepare to change from their reptile to their flying ſtate, they quit the water for a dry place, as graſs, pieces of wood, ſtone, or any thing elſe they meet with. They there firmly fix their acute claws; and for a ſhort time continue immoveable. The ſkin firſt opens on the head and back; out of this opening they exhibit their real head and eyes, and at length their ſix legs; whilſt the empty ſkin, or ſlough of their legs, remains firmly fixed in its place. After this, the incloſed creature creeps forward by degrees; drawing firſt its wings, then its body, out of the ſkin; and proceeding a little farther, reſts for ſome time, as if immoveable. During this time the wings, which were moiſt and folded, by degrees expand, and ſmoothen their plaits, which were laid againſt each other, like a cloſed fan. The body is likewiſe inſenſibly extended, until the limbs have obtained their proper dimenſions. All theſe ſurpriſing and difficult operations are accompliſhed by the force of the blood and the circulating humours. The creature cannot at firſt uſe its new wings, but is forced to ſtay in the ſame place till its limbs are dried by the circumambient air. It ſoon, however, wings the air, and ſelects the variety of its proviſions. Nature has provided it with two large eyes, which make almoſt the whole head, and which reſemble glittering mother of pearl. It has four expanſive ſilver-coloured wings, with which, as with oars, it can turn itſelf ſwiftly; and a very long body, which, like a rudder, directs its motions. As the wings are long, and the legs ſhort, they ſeldom walk, but are ever ſeen either reſting or flying. They always chuſe dry branches of trees or ſhrubs to ſettle on; and, when refreſhed a little, renew their flight.

They are tyrants of the inſect tribe; and, like the hawk, only hovering to ſeize their prey. They are the ſtrongeſt and moſt courageous of winged inſects. The blue fly, the bee, the waſp, the hornet, and the

the butterfly, are their prey. They ſpend the whole day in purſuit, and have been ſeen to devour three times their own ſize in a ſingle hour. They ſeize their prey flying, with their ſix claws, and eaſily tear it to pieces with their teeth.

The males ſeek the females with great ardour; their part is placed not at the end of the tail, but under the breaſt; that of the female lies in the tail. When he finds himſelf ſufficiently near the female, he ſeizes the back of her head; and faſtening his claws upon her, turns his forky tail, which he faſtens round her neck, and fixes himſelf cloſely and firmly, often for three or four hours. When he flies, ſhe is obliged to fly with him; he ſtill directs the way, and ſhe ſeems entirely guided by his motion. At laſt, turning up the end of her tail to his breaſt, her eggs receive the neceſſary fecundation. An hour or two after, ſhe flies to ſome neighbouring pool to depoſit her eggs. They continue in a reptile ſtate for a year, and then are changed into a beautiful fly, reſembling the parent.

THE FORMICA-LEO, OR LION-ANT,

WHEN it becomes an inhabitant of air, reſembles that already deſcribed; its gloſſy wings, its voracious appetites, its manner of generation, are the ſame. In its reptiles ſtate it differs.

The Lion-Ant, in its reptile ſtate, is the ſize of a common woodlouſe, but ſomewhat broader; has a long head, and a roundiſh body, narrow towards the tail; colour, dirty-grey, ſpeckled with black; the body compoſed of ſeveral flat rings, which ſlip one upon another. It has ſix feet, four fixed to the breaſt, and two to the neck. The head is ſmall and flat, and has two little ſmooth horns and feelers, hard, about a quarter of an inch long, crooked at the ends: at their baſis are two ſmall black lively eyes, by which it can ſee the ſmalleſt object, as is eaſily diſcovered by its ſtarting from every thing that approaches.

This animal poſſeſſes the moſt ravenous appetites in nature. Its legs only enable it to run backward; ſo that, be it never ſo famiſhed and rapacious (as it ever ſeems) its prey muſt come to it, or rather into its ſnares. It chuſes a dry ſandy place, at the foot of a wall, or under ſome ſhelter,

to preſerve its labours from rain. A heavy clogged earth would defeat its labour. When it commences the hole for its trap, it bends the hinder part of its body, which is pointed, and works backward, making a circular furrow; within this firſt it digs a ſecond, a third, and others always leſs than the preceding. Then it begins to deepen its hole, ſinking it lower and lower in the ſand, which it throws with its horns, or feelers, toward the edges. This hole is always a circle, and reſembles an inverted funnel. When this inſect is quite young, its firſt pit is very ſmall; as it grows, it makes a larger. It is generally two inches deep, and as much in diameter. The inſidious inſect places itſelf in ambuſh, hiding in the bottom under the ſand, ſo that its two horns encircle the bottom of the pit. The ſides of this pit-fall are made of the moſt looſe and crumbling materials; ſo that ſcarce any inſect can climb up, that has once got down to the bottom. If then an ant, a wood-louſe, or ſmall caterpillar walk too near the edge of this precipice, the ſand gives way beneath them, and they fall to the bottom to inevitable deſtruction. The fall of a ſingle grain of ſand gives notice at the bottom, and the murderer never fails to ſally forth to ſeize its prey. If the ant or wood-louſe is too nimble, and runs up the ſides of the pit-fall, the lion-ant, by means of its broad head and feelers, throws up a ſhower of ſand, which falling on the ſtruggling captive with tremendous weight, once more cruſhes it down to the bottom; then no efforts can releaſe it: the lion-ant ſeizes it with its feelers, which are hollow, and darting them both into its body, ſucks out all the little animal's juices with the utmoſt rapacity. The prey thus reduced to a huſk, his next care is to remove the body from its cell, leſt its appearance might warn others of danger; he takes up the waſted trunk with his feelers, and throws it, with wonderful ſtrength, at leaſt ſix inches from the edge of his hole; and ſets about mending the breaches his fortifications had received in the laſt engagement. Nothing can abate its induſtry, its vigilance, its patience, or its rapacity. It will work for a week at its pit-fall; it will continue on the watch a month, expecting the approach of prey; and, if it comes in plenty, will quit the inſect it has newly killed, to kill another: yet is ſurpriſingly patient of hunger, ſome having been kept in a box with ſand ſix months without feeding.

When it is to change its form, it quits its uſual rapacious habits, but keeps its induſtry. It furrows up the ſand all round irregularly; teſtifying thoſe workings and violent agitations which moſt inſects exhibit previous to their transformation. Theſe animals are produced in autumn,

generally live a year, perhaps two, before they aſſume a winged form. After furrowing up the ſand, it hides itſelf under it, horns and all. It there ſpins a thread, which being glutinous and humid, ſticks to the little particles of ſand among which it is ſpun; and the inſect rolls up its web, ſand and all, into a ball, about half an inch in diameter, of which itſelf is the center, and its apartment ſufficiently ſpacious for its motions, compoſed of ſilk only, of a fine pearl colour, extremely delicate and beautiful. It ſeems externally a lump of ſand; and thus eſcapes the ſearch of birds, &c. The inſect continues ſhut up ſix weeks or two months; and gradually parts with its eyes, its feelers, its feet, and its ſkin; all which are thruſt into a corner of the inner apartment, like a rag. It then appears almoſt in its winged ſtate, except that a thin ſkin enwraps the wings, that appears to be a liquor dried on their outſide. When its members have acquired the neceſſary conſiſtence and vigour, it breaks through its encloſure. For this purpoſe it has two teeth, like thoſe of graſshoppers, with which it eats through till it gets out. Its body, which is turned like a ſcrew, is but a quarter of an inch; but, when unfolded, becomes half an inch in length; its wings, that ſeemed to occupy the ſmalleſt ſpace, in two minutes time become longer than the body. It becomes a large and beautiful fly of the libellula kind; with a long, ſlender, brown body; ſmall head, large bright eyes, long ſlender legs, and four large tranſparent reticulated wings. The reſt of its habits reſemble that inſect whoſe form it bears; except that, inſtead of dropping its eggs in the water, it depoſits them in the ſand.

THE GRASSHOPPER, LOCUST, CICADA, CRICKET, AND MOLE-CRICKET.

THE GRASSHOPPER, that breeds in every meadow, and chirps through the ſummer, is well known to us; its hiſtory relates that of the reſt. This animal is the colour of green leaves, except a line of brown which ſtreaks the back, and two pale lines under the belly and behind the legs. It may be divided into the head, the corſlet, and the belly. The head is oblong, regarding the earth, and bearing ſome reſemblance to that of a horſe. Its mouth is covered by a kind of round buckler

buckler jutting over it, and armed with brown teeth, hooked at the points; within the mouth is a large reddiſh tongue, fixed to the lower jaw. The feelers or horns are very long, tapering off to a point; and the eyes are like two black ſpecks, a little prominent. The corſlet is elevated, narrow, armed above and below by two ſerrated ſpines. The back is armed with a ſtrong buckler, to which the muſcles of the legs are firmly bound; and round theſe muſcles are ſeen the veſſels by which the animal breathes, as white as ſnow. The laſt pair of legs are much longer and ſtronger than the firſt two pair, fortified by thick muſcles, and formed for leaping. It has four wings; the anterior ſpringing from the ſecond pair of legs, the poſterior from the third pair. The hinder wings are much finer and more expanſive than the foremoſt, and are the principal inſtruments of its flight. The belly is large, compoſed of eight rings, terminated by a forky tail, covered with down. When examined internally, beſide the gullet, we diſcover a ſmall ſtomach; behind that a very large one, wrinkled and furrowed withinſide; lower down is a third; ſo that it is not without probability animals of this order are ſaid to chew the cud, as they ſo much reſemble ruminant animals in their internal conformation.

Shortly after the graſshopper aſſumes its wings, it fills the meadow with its note, which is a call to courtſhip. The male only is vocal; at the baſe of the wings is a little hole in its body, covered with a fine tranſparent membrane. This Linnæus thought to be the inſtrument it employs in ſinging; others think the ſound is produced by rubbing its hinder legs againſt each other. The note of one male is ſeldom heard, but it is anſwered; and the two little animals, after many mutual inſults of this kind, meet and fight deſperately. The female is generally the reward of victory; for, after the combat, the male ſeizes her with his teeth behind the neck, and thus keeps her ſeveral hours ſtrongly united.

Towards the end of autumn the female prepares to depoſit her burthen; ſhe is greatly diſtended with eggs, to the number of an hundred and fifty. Nature has furniſhed her with an inſtrument at her tail, ſomewhat reſembling a two-edged ſword, which ſhe can ſheathe and unſheathe: with this ſhe pierces the earth as deep as ſhe is able, and in the hole it has made ſhe depoſits her eggs, one after the other. She does not long ſurvive; but, as the winter approaches, dries up and dies. Some aſſert ſhe is killed by the cold; others, that ſhe is eaten by worms. Neither the male nor female ever ſurvive the winter. The eggs are oval, white, and horny; their ſize nearly equals anniſeed; they

are enveloped by a covering, and crack on being preſſed between the fingers: their ſubſtance within is a whitiſh, viſcous, and tranſparent fluid; they remain depoſited beneath the earth during winter, till ſpring begins to hatch them. In May, every egg produces an inſect the ſize of a flea; at firſt, whitiſh; after two or three days they turn black; ſoon after, a reddiſh brown. They appear from the beginning like graſshoppers wanting wings, and hop among the graſs with great agility. The wings are concealed within four little bunches, that ſeem to deform the ſides of the animal, rolled up moſt curiouſly in the ſmalleſt ſpace. Above twenty days after its excluſion, it prepares for emancipation, ceaſes from its graſſy food, and ſeeks a convenient place beneath ſome thorn or thiſtle, that may protect it from a ſhower; ſuffering the ſame laborious writhings and workings, heavings and palpitations, as other inſects. At length, the ſkin covering the head and breaſt divides above the neck; the head iſſues out firſt from the burſting ſkin, the other parts follow. Thus diſengaged, it appears perfect, but feeble, ſoft and tender: it may be molded like wax. It is now a greeniſh white, which becomes more vivid as the moiſture on the ſurface is dried away. Spent and fatigued with its labour for more than an hour together, it ſhews no ſign of life; but the body is drying; and the wings, fold after fold, opening to the ſun, at laſt become longer than the hind legs; the body alſo is lengthened, and becomes much more beautiful.

Theſe inſects are generally vocal in ſummer, and at ſun-ſetting louder than during the heat of the day. They feed on graſs. Unwilling to fly, and ſlow in flight, particularly when the weather is moiſt or cool, yet they ſometimes fly to conſiderable diſtances. If caught by one of the hinder legs, they leave the leg behind them: this does not grow again, but prevents their flying; for, being unable to lift themſelves in the air, they have not room on the ground for proper expanſion of their wings. If handled roughly, they bite fiercely; and when they fly, make a noiſe with their wings. They generally keep in the plain, where the graſs is luxuriant, and the ground rich and fertile: there they depoſit their eggs, particularly in thoſe cracks which are formed by the heat of the ſun.

The larger kinds only differ in ſize, in rapidity of flight, and their powers of injury, by ſwarming on the productions of the earth. When a ſwarm of LOCUSTS, two or three miles long, and ſeveral yards deep, ſettle on a field, the conſequences are terrible. Though they ſeldom viſit Europe in ſuch dangerous ſwarms as formerly, yet in ſome of the ſouthern countries they are ſtill formidable.

The GREAT BROWN LOCUST was ſeen in ſeveral parts of England in 1748, and many dreadful conſequences were apprehended from its appearance. This inſect is three inches long, and has two feelers an inch in length. The head and horns are browniſh; about the mouth blue, as alſo the inſide of the larger legs; the ſhield on the back greeniſh; the upper ſide of the body brown, ſpotted with black, the under ſide purple; the upper wings brown, with ſmall duſky ſpots, a larger at the tips; the under wings tranſparent, light brown, tinctured with green, a dark cloud of ſpots near the tips. This inſect has threatened us often with its viſitations; and is truly terrible where it is bred. No animal in the creation multiplies ſo faſt, if the ſun be warm, and the ſoil in which their eggs are depoſited dry.

When locuſts take the field, we are aſſured they have a leader whoſe flight they obſerve, and pay a ſtrict attention to. They appear, at a diſtance, like a black cloud, which, as it approaches, gathers on the horizon, and almoſt hides the light of the day. Often the huſbandman ſees this imminent calamity paſs away, and the whole ſwarm proceed onward to ſome leſs fortunate country: but wretched is the diſtrict on which they ſettle; they ravage the meadow and the arable ground; ſtrip the trees of their leaves, and the garden of its beauty: a few minutes deſtroy the expectations of a year, and induce famine. In the tropical climates they are not ſo dreadful as in the ſouthern parts of Europe; for there the power of vegetation is ſo great, that a ſmall interval repairs the calamity: but our verdure muſt wait the enſuing ſpring to repair the damage; beſides, in their long flights to theſe parts, they are famiſhed, and therefore more voracious where they ſettle. But what they devour is not equal in damage to what they deſtroy. Their bite is thought to contaminate the plant, and prevent its vegetation. To uſe the expreſſion of the huſbandman, they burn whatever they touch, and leave the marks of their devaſtation for two or three years enſuing. But, if noxious while living, they are worſe when dead; wherever they fall, they infect the air, and the ſmell is inſupportable.

In the year 1690, a cloud of locuſts entered Ruſſia in three places, and ſpread themſelves over Poland and Lithuania, in ſuch aſtoniſhing multitudes, that the air was darkened, and the earth covered with their numbers. In ſome places they were ſeen lying dead, heaped on each other four feet deep; in others, they covered the ſurface like a black cloth; the trees bent beneath their weight; and the damage which the country

country ſuſtained exceeded computation. In 1724, Doctor Shaw was a witneſs in Barbary of their devaſtations. They firſt appeared at the end of March, when the wind had been ſoutherly for ſome time. In April, their numbers were ſo vaſtly increaſed, that in the heat of the day they formed themſelves into large ſwarms, which appeared like clouds, and darkened the ſun. In May they diſappeared, retiring into the plains to depoſit their eggs. In June the young made their appearance, forming many compact bodies of ſeveral hundred yards ſquare; which afterwards marching forward, climbed trees, walls, and houſes, eating every thing green in their way. The inhabitants, to ſtop their progreſs, laid trenches all over their fields and gardens, filling them with water. Some placed large quantities of heath, ſtubble, and combuſtible matter, in rows, and ſet them on fire on the approach of the locuſts: but the trenches were quickly filled up, and the fires put out, by the vaſt number of ſwarms that ſucceeded each other. A day or two after one of theſe was in motion, others juſt hatched came gleaning after them, gnawing off the young branches, and the very bark of the trees. Having lived near a month in this manner, they arrived at their full growth, and threw off their worm-like ſtate, by caſting their ſkins. To prepare for this change, they fixed their hinder feet to ſome buſh or twig, or corner of a ſtone; when, by an undulating motion, their heads would firſt appear, and ſoon after their bodies. The whole transformation was performed in ſeven or eight minutes; after which, they were a little while languiſhing; but when the ſun and air had hardened their wings, and dried up their moiſture, they returned to their former greedineſs, with additional ſtrength and agility. After laying their eggs, they directed their courſe northward, and probably periſhed in the ſea. It is ſaid that the holes theſe animals make, to depoſit their eggs, are four feet deep in the ground; the eggs are about fourſcore in number, of the ſize of caraway comfits, and bundled up together in cluſters.

It ſeems probable that, by means of a very dry ſeaſon in the heart of Africa, they are propagated in ſuch numbers, that the vegetables are not ſufficient to ſuſtain them; but, being obliged to find out other countries, they traverſe ſandy deſerts, where finding nothing to allure them from their height, they proceed forward, and thus come into Europe, where they alight on the firſt green paſtures.

Locuſts are eaten in many kingdoms of the Eaſt, and are caught in ſmall nets; they parch them over the fire in an earthen pan; and when their

their wings and legs are fallen off, they turn reddiſh like boiled ſhrimps. The natives of Barbary eat them fried with ſalt; they are ſaid to taſte like crayfiſh.

There is a locuſt in Tonquin about the bigneſs of the top of a finger, and as long as the firſt joint. It breeds in the earth, in low grounds. In January or February they iſſue from the earth in vaſt ſwarms; at firſt they can hardly fly, ſo that they often fall into the rivers in great numbers; and the natives, in theſe months, watch the rivers, to take them up in multitudes in ſmall nets. They either eat them freſh, broiled on the coals, or pickle them for keeping. They are conſidered as a great delicacy in that part of the world, as well by the rich as the poor. They are regularly brought to market.

The GREAT WEST-INDIAN LOCUST, individually conſidered, is the moſt formidable; about the thickneſs of a gooſe-quill; the body divided into nine or ten joints, in all ſix or ſeven inches long. It has two ſmall eyes, ſtanding out of the head like thoſe of crabs, and two feelers like long hair; the whole body is ſtudded with ſmall excreſcences, which are not much bigger than the points of pins; the ſhape is roundiſh, and the body diminiſhes in circumference to the tail, which is forked into two horns; between theſe there is a ſort of a ſheath, containing a ſmall dangerous ſting. If any perſon happens to touch this inſect, he is ſure to be ſtung, and is immediately taken with a ſhivering and trembling, which may ſoon be checked by rubbing the place affected with a little palm-oil.

Though there be a ſpecies of CRICKET that lives in the woods and fields, yet we are beſt acquainted with the Houſe-Cricket, whoſe voice is ſo well known behind a country fire in a winter's evening. The cricket very much reſembles the graſshopper in ſhape, manner of ruminating, voice, leaping, and method of propagation. It differs in colour, which is uniformly a ruſty brown; its food is various, and its place of reſidence moſt uſually the warmeſt chinks of a country hearth; where they once make their abode, they are ſure to propagate. They are of a moſt chilly nature, ſeldom leaving the fire-ſide; and, if undiſturbed, are ſeen to hop from their retreats to chirrup at the blaze. The wood-cricket is extremely timorous; but the chimney-cricket, being uſed to noiſes, diſregards them, and people near it. Whether the voice of this animal is formed by a fine membrane at the baſe of the wings, is not aſcertained; nor do we know the uſe of this voice, ſince anatomical inſpection has not been able to diſcover the ſmalleſt organs of hearing.

doubtleſs they can diſtinguiſh ſounds, though probably not like the more perfect ranks of nature: certainly their call is often regularly anſwered: none but males are vocal. As the cricket lives chiefly in the dark, its eyes ſeem formed for obſcurity; to ſurpriſe it, requires only to light a candle unexpectedly, by which being dazzled, it cannot find the way back to its retreat. It is very voracious; eats bread, flour, meat; is fond of ſugar: never drinks. Except in the very coldeſt weather, never ceaſes chirping.

Of all the kinds the MOLE-CRICKET is moſt extraordinary; is a large inſect, two inches and a half in length, and three quarters of an inch in breadth. At the extremity of the tail are two hairy excreſcences, reſembling in ſome ſenſe the tail of a mouſe. The body has eight ſcaly joints or ſeparate folds, brown above, deeper tinged below; wings long, narrow, terminate in a point; each has a blackiſh line running down it; when extended, they ſeem much broader than could be ſuppoſed. The ſhield of the breaſt is firm, blackiſh, and hairy; the fore-feet, which are this animal's principal inſtruments of burrowing, are ſtrong, webbed, and hairy; it generally runs backward; lives under ground, where it burrows faſter than a mole. Is thought to be amphibious. Is deteſted by gardeners; for in a ſingle night it will run along a furrow newly ſown, and rob it of all its contents. Its legs are ſo formed that it can penetrate the earth in every direction; before, behind, and above. At night it ventures from its under-ground habitation, and has its chirping call. The female makes a cell of clammy earth, large enough to hold two hazle nuts, and in this ſhe lays her eggs. The whole neſt equals a hen's egg, is cloſed up, and well defended from the air and enemies. The eggs are generally a hundred and fifty, white, the ſize of a carraway. The black beetle, being an under-ground inhabitant, would devour or deſtroy the eggs; to prevent this, the female mole-cricket is often poſted as a centinel near the neſt; and when the black invader plunges in to ſeize its prey, the guardian inſect ſeizes him behind, and inſtantly bites him in two. Wherever the neſt is, there ſeems a fortification, avenues, and entrenchments drawn round it; numberleſs winding ways lead to it, and a ditch is drawn about it, which few of its inſect enemies are able to paſs; alſo, at the approach of winter, they carry their neſt away, and ſink it deeper in the ground, that the froſt may have no influence in retarding the young brood. As the weather grows milder, they raiſe their magazine till near the ſurface, to receive the genial influence of the ſun, without expoſing it. Should the froſt unexpectedly return, they ſink it again.

THE

THE EARWIG, THE FROTH INSECT, AND SOME OTHERS.

OF all this claſs of inſects, the EARWIG undergoes the ſmalleſt change. This animal is ſo common it ſcarce needs a deſcription: its ſwiftneſs in the reptile ſtate is not leſs remarkable than its indefatigable velocity when on the wing. That it is very prolific appears from its numbers; it is harmleſs. It is provided with ſix feet, and two feelers: the tail is forked, and with this it often attempts to defend itſelf againſt aſſailants; but its attempts no way ſerve to defend it. The deformity of its ſlender figure has ſubjected it to an imputation which has more than once proved its deſtruction. Theſe reproaches are groundleſs. It lives among flowers, and deſtroys them. When fruit has been wounded by flies, the earwig generally comes in for a ſecond feaſt, and ſucks thoſe juices they began to broach.

The earwig is hatched from an egg. There are various kinds of this animal, which chuſe different places to breed in; in general, under the bark of plants, or in the cleſts of trees beginning to decay. They proceed from the egg in that reptile ſtate in which they are moſt commonly ſeen; as they grow larger, the wings under the ſkin begin to burgeon. It is amazing how very little room four large wings take up before they are protruded: their ſheath folds and covers them ſo neatly, that the animal ſeems without wings; and, when burſt from confinement, they can be cloſely folded into a very narrow compaſs. When the earwig has become winged, it flies in purſuit of the female, which is its whole buſineſs. It lives, in its winged ſtate, but a few days; and having provided poſterity, dries up and dies.

To this order of inſects we may refer the CUCKOW-SPIT or FROTH-WORM, that is often found hid in a frothy matter on the ſurface of plants. It has an oblong, obtuſe body; a large head, with ſmall eyes; four wings, the external duſky brown, marked with two white ſpots; the head black. The ſpume in which it wallows is its own formation, and reſembles frothy ſpittle. It proceeds from the vent and other parts of the animal; if wiped away, a new quantity will quickly ſucceed. Within this ſpume it acquires four tubercles on its back, wherein are the wings; theſe burſting, it becomes winged, flies to meet its mate, and prolong its kind.

The WATER TIPULA has an oblong ſlender body, four feet fixed on the breaſt, four feelers near the mouth; four weak wings, apparently not proper for flying, but leaping only. It runs with wonderful lightneſs on the ſurface of the water, ſo as ſcarcely to put it in motion. It is ſometimes ſeen in rivers, and on their banks, eſpecially under ſhady trees; and generally in ſwarms.

The COMMON WATER-FLY alſo breeds in this ſame manner. This is by ſome called the Notonecta, becauſe it does not ſwim on its belly, but on its back: nor can we help admiring that fitneſs in this inſect for its ſituation, as it feeds on the under ſide of plants which grow on the ſurface of the water; therefore, being formed mouth upwards, it feeds with greater convenience.

The WATER-SCORPION is near an inch in length, and about half an inch in breadth. Its body nearly oval, very flat and thin; its tail long and pointed. The head ſmall; the feelers appear like legs, reſembling the claws of a ſcorpion, but without points. This inſect is generally found in ponds, and is very tyrannical and rapacious. It deſtroys twenty times as many as its hunger requires. I have ſeen one of theſe, put into a baſon of water, in which were thirty or forty worms of the libellula kind, each as large as itſelf, deſtroy them all in few minutes, getting on their backs, and piercing with its trunk through their body. Theſe animals however, though ſo formidable to others, are nevertheleſs themſelves greately overrun with a little kind of louſe, about the ſize of a nit, which very probably repays the injury which the water-ſcorpion inflicts upon others.

Water ſcorpions live in the water by day; out of which they riſe in the duſk of the evening, and flying from place to place, betake themſelves, in queſt of food, to other waters. The inſect, before its wings are grown, remains in the place where it was produced; but, when perfect, ſallies forth in ſearch of a companion, to continue its poſterity.

THE EPHEMERA.

THAT there ſhould be a tribe of flies whoſe duration extends but to a day, ſeems ſurpriſing; but the ſurpriſe increaſes, when we are told

told that ſome of this kind ſeem limited to an hour. The reptile from which they are bred is not ſhort-lived; but ſometimes lives two years, and many times three.

Ephemeras, of which are various kinds, are produced from eggs, in the form of worms; from whence they change to aurelias, a kind of middle ſtate between a worm and a fly; from whence they take their laſt mutation into a beautiful fly, of longer or ſhorter duration, according to its kind.

The ephemera fly is a beautiful winged inſect, of ſtrong ſimilitude to the butterfly, both in ſhape, wings, and ſize; but its wings are not covered with painted feathers, but are very tranſparent and thin; has four wings; the uppermoſt much the largeſt: when at reſt, generally lays its wings one over the other, on the back. The body is long; has ſix rings, larger at the origin than the extremity; from this proceeds a tail longer than all the reſt of the fly, conſiſting ſometimes of three threads of equal length, ſometimes of two long and one ſhort. To acquire this beautiful form, the inſect has undergone ſeveral tranſmutations: but the hour of its perfection is the hour of its death; the reptile of this fly inhabits the water, and reſembles fiſhes in many particulars; having gills by which it breathes at the bottom, and the tapering form of aquatic animals. Theſe inſects have ſix ſcaly legs, fixed on their corſelet. Their head is triangular: the eyes placed forward, diſtinguiſhed by their largeneſs and colour. The mouth has teeth; the body conſiſts of ſix rings; that next the corſelet largeſt, growing leſs and leſs to the end; the laſt ring is the ſhorteſt, from which the three threads proceed, which are as long as the whole body. Thus the reptile reſembles the fly; and only requires wings to be near perfection.

There are ſeveral kinds of this animal, and their aurelias are of different colours; yellow, brown, or cream-coloured. Some bore themſelves cells at the bottom of the water, from which they never ſtir out, but feed on the mud compoſing the walls of their habitation; others range about in the water, or quit that element to feed on plants by the river ſide, and then return to it for ſafety and protection.

The reptile, though it lives long, offers little to excite curioſity; hid at the bottom of the water, it feeds almoſt wholly within its narrow habitation. Into its fly ſtate it crowds its moſt various tranſactions. The ſign whereby to know that theſe reptiles will change into flies ſhortly, is a protuberance of wings on the back; ſo that the wings are in ſome degree viſible through their

their external ſheath. Along the banks of the Rhine, or the Seine near Paris, about three days in the midſt of ſummer, their numbers and aſſiduity are aſtoniſhing: the whole air ſeems alive with the new-born race, and the earth is covered with their remains. The aurelias beneath the water wait only for evening to begin their transformation. The moſt early ſhake off their old garments about eight o'clock; the later before nine. They are ſcarce lifted above the water, ere their old ſheathing ſkin burſts; and through it a fly iſſues, whoſe wings, the ſame inſtant, are unfolded, and lift it into the air. Millions thus riſe to the ſurface; and fill every quarter with their flutterings. But the whole ſoon fall to the ground, and cover the earth, like a deep ſnow; every object they touch becomes fatal; and they inſtantly die, if they hit even againſt each other.

The males ſeem only born to die: they follow not the oppoſite ſex; but after fluttering an hour or two, they drop. But the females are ſcarce riſen from the water, and have dried their wings, ere they haſten to drop their eggs back again. If they happen to flutter on land, they depoſite their burthen where they drop. We know not how theſe eggs are fecundated. The females are in ſuch haſte to depoſite their eggs, that multitudes fall to the ground; but the greateſt part are laid in the water. As they flutter on the ſurface, two cluſters are ſeen iſſuing from the extremity of their body, each containing about three hundred and fifty eggs.

It would ſeem there was a neceſſity for ſuch fertility, as in its reptile ſtate it is the favorite food of every kind of freſh-water fiſh. In vain theſe little animals form galleries at the bottom of the river; many kinds of fiſh break in on their retreats, and thin their numbers. Theſe inſects are the moſt grateful bait for fiſh. The uſual date of theſe flies is two or three hours; yet ſome live ſeveral days; and one kind, after quitting the water, has to quit another caſe or ſkin. Theſe are often ſeen in fields and woods, but frequently in the vicinity of water. They are often found ſticking on walls and trees, with the head downwards, without changing place, or ſenſible motion; waiting for the moment when they ſhall be diveſted of their laſt garment, which ſometimes does not happen for two or three days.

CATERPILLARS.

CATERPILLARS alone, with their butterflies and moths, make a third part of inſects. In their butterfly ſtate, they are prodigiouſly beautiful and ſplendid. The fly may therefore well excite our curioſity to examine the reptile.

Caterpillars may be diſtinguiſhed from worms or maggots by their feet; they are the earlieſt ſeen in ſpring on almoſt every vegetable and tree, eating its leaves. They have feet before and behind, and move forward by arch-like ſteps made by their fore and hinder parts: they climb vegetables, and ſtretch themſelves out from their boughs and ſtalks, to reach food at a diſtance; have from eight feet to ſixteen. A butterfly or a moth is diſtinguiſhed by its wings covered with a painted duſt, of various beauty.

Their tranſmutations are more numerous than thoſe of inſects yet mentioned; they are placed in the third order of changes by Swammerdam. When excluded from the egg, they aſſume the form of a ſmall caterpillar, which feeds and grows larger every day, often changing its ſkin, but preſerving its form. When come to a certain magnitude, it diſcontinues eating, makes itſelf a covering or huſk, in which it remains wrapped up, ſeemingly without life or motion; and after ſome time ſpent in this ſtate, it burſts confinement, and comes forth a beautiful butterfly.

Experience proves that Caterpillars are hatched from the eggs of butterflies; and the fly is very careful in depoſiting its eggs where they are likely to be hatched with greateſt ſafety and ſucceſs. During winter, they are in an egg ſtate; and brave the rigours and humidity of climate: often expoſed to its changes, ſtill they preſerve the latent principle of life which is to be exerted at the approach of ſpring.

But all caterpillars riſe not from eggs in ſpring; for many have ſubſiſted in their aurelia ſtate during the rigours of winter; ſome incloſed in a kind of ſhell, which they ſpun for themſelves at the end of autumn; ſome concealed under the bark of trees; others in the chinks of old walls; and many buried under ground. From theſe iſſue a variety of butterflies, and adorn the early part of the year with flutterings. Some caterpillars continue in their reptile ſtate through the ſevere ſeaſon, in ſome ſecure retreat, where they remain motionleſs and inſenſible, as if

actually dead. Of this kind are found great numbers together, inclosed in one common web, to protect them from the injuries of the air. Some butterflies live all the winter: these are found lifeless and motionless in the hollows of trees, or the clefts of timber; but, being approached to a fire, they recover life and activity, and seem to anticipate the desires of spring. Many are hatched from their egg at the foot of a tree, and climb to its leaves for subsistence: the eggs of others have been glued by the parent butterfly to the leaves; and they are no sooner excluded from the shell, but they find themselves in the midst of plenty.

The caterpillar recent from the egg is small and feeble, and seems to make no great consumption; but as it increases in magnitude it improves in appetite; and when adult is ravenous. A single caterpillar will eat double its own weight of leaves in a day.

The body of a caterpillar is composed of rings, pretty near circular or oval; generally twelve; membranaceous. The head is connected to the first ring by the neck, which is generally so short it is scarce visible: the head is covered by a shell; the jaws are placed rather vertically, each armed with a large thick tooth, with which some defend themselves against their enemies. Though the mouth be shut, the teeth are uncovered, and seldom without employment. Many, while young, eat only the succulent part of the leaf, and leave the fibres; others eat the whole leaf clean away. Some eat all day long, others have their hours of repast, and some chuse the night: to attack a leaf, it places the edge of the leaf between its feet, which keep it steady, while the teeth are cutting it: these act somewhat like a gardener's sheers; and every morsel is swallowed as soon as cut. Some feed on very narrow leaves, not broader than their mouths; these it devours from the point.

Of their feet the six foremost have a shining gristly covering; and are called shelly legs. The hindmost, whatever be their number, are soft and flexible, and are called membranaceous. With regard to their external figure, they are either smooth or hairy: the first kind is soft to the touch, or hard like shagreen; the latter hairy, and as it were thorny; and generally, if handled, stings like nettles.

Caterpillars, in general, have six small black spots on the fore ring, a little to the side of the head: three larger than the others, convex and transparent: these Reaumur takes to be eyes.

The stigmata, or holes on its sides, through which it is supposed to breathe, are easily discoverable: nine on a side, rather nearer the belly than the back; a hole for every ring of the body, except the second, the third,

third, and the laſt. Theſe oval openings may be conſidered as ſo many mouths, through which the inſect breathes into its lungs, which are conſequently eighteen. They appear at firſt view to be hollow cartilaginous tubes, mother-of-pearl colour. They often unite with each other; ſome open into the inteſtines, and ſome go to different parts of the ſurface of the body. That theſe convey air, appears from the experiment of Malpighi; who by ſtopping up the mouths of theſe ſtigmata with oil, quickly ſuffocated the animal. Oil on other parts of the body, leaving the ſtigmata free, ſeemed innocent; the inſect continued to move and eat as uſual: he rubbed on the ſtigmata of one ſide, and it underwent a partial convulſion, but recovered ſoon after. Caterpillars will live in an exhauſted receiver ſeveral days.

The inteſtines run ſtraight from the mouth to the anus. They reſemble a number of ſmall bags opening into each other; ſtrengthened on both ſides by a fleſhy cord, by which they are united. Caterpillars often caſt the internal coat of their inteſtines with their food, in their frequent changes. But the inteſtines take up a ſmall part of the body, compared to the fatty ſubſtance in which they are involved. This ſubſtance changes its colour when the inſect's metamorphoſis approaches, and from white uſually becomes yellow. All caterpillars ſpin at one time or other, like the ſilk-worm.

Many caterpillars change their ſkins five or ſix times in a ſeaſon; and this caſt-off covering ſeems ſo complete, that it might be miſtaken for the real inſect. Among hairy caterpillars, the caſt ſkin is covered with hair; the feet, as well griſtly as membranous, remaining; even the parts which nothing but a microſcope can diſcover, are viſible in it; all the parts of the head; not only the ſkull, but the teeth. As the time approaches for the caterpillar to caſt its ſkin, its colours become more feeble, and the ſkin ſeems to wither and dry like a leaf no longer ſupplied with moiſture. A day or two before the critical hour, the inſect ceaſes to eat, loſes its uſual activity, and ſeems immoveable: it ſeeks ſecurity; and, no longer timorous, ſeems regardleſs of the touch. It often bends itſelf, elevates its back, ſtretches itſelf to its utmoſt extent: lifts up its head, and lets it fall, waves it three or four times from ſide to ſide, and then remains quiet. At length, ſome of the rings of its body, particularly the firſt and ſecond, ſwell conſiderably, the old ſkin diſtends and burſts; till, by repeated ſwellings and contractions in every ring, the animal diſengages itſelf, and creeps from its inconvenient covering, in the ſpace of a minute; and ſeems to enjoy new vigour, as well as colouring and beauty. The hairy preſerve their hair; for every hair appears to have been drawn.

A new crop of hair grows between the old ſkin and the new, and probably helps to throw off the external covering.

The caterpillar begins at laſt to prepare for its change into a chryſalis. It is probable all parts of the butterfly lay hid in the inſect, in its reptile ſtate; and, when perfected, its firſt great and principal change is into an aurelia, or chryſalis. Preparatory to this, it attaches itſelf to the ſtalk or ſtem of the plant, often voids even the internal membrane which lined its inteſtines. Thoſe which ſpin a web, ſet about that operation; thoſe which have already ſpun, await the change in patience. When it has done ſpinning, it ſtrikes in the claws of the two feet under the tail, and afterwards forces in the tail itſelf. If taken from the web they appear in great languor; and, incapable of walking, thus they remain one or two days, preparing to change; their bodies bent into a bow, which they occaſionally ſtraighten. As their change approaches, their body becomes more and more bent; their extenſions and convulſive contractions more frequent. The animal quits the hinder part of its ſkin to drive itſelf up into the fore part, ſtill continuing to heave and work as before; the ſkull burſts into three pieces; and an opening is made in the three firſt rings, through which the inſect thruſts forth its naked body, with ſtrong efforts, and gets free from its caterpillar ſkin. Now the parts of the future butterfly are viſible; but ſo ſoft, that the ſmalleſt touch diſcompoſes them. The animal is now become helpleſs and motionleſs; waiting for the air to dry up its ſuperficial moiſture, and ſupply it with a cruſt for reſiſting injuries: it is now green. In ten or twelve hours its parts harden, its external covering becomes firm; and in about four-and-twenty hours the chryſalis may be handled without danger. Such is the little pod or cone ſo common by every pathway, ſticking to nettles, and ſometimes ſhining like poliſhed gold; whence its name, Chryſalis.

Some mix ſand with their gummy and moiſt webs, to ſtrengthen the incruſtation; others bury themſelves in the ground. Thoſe that are to remain in this ſtate but a few days, chooſe ſome tender leaf, which they render more pliant by diffuſing a kind of glue on it: the leaf gradually curls up, and withering as it enfolds, the inſect wraps itſelf within it. Others faſten their tails to a tree, or to the firſt worm-hole they meet in a beam, and there wait. Such as are to lie ſeveral months in this ſtate, act with greater circumſpection: either mix their web with ſand, or build deeper in wood. Such as prefer the leaves of willows, break their tender twigs into ſmall pieces, then pound them to powder; and, by their

their glutinous ſilk make a kind of paſte, in which they enwrap themſelves. Many are the forms they aſſume in this helpleſs ſtate; and often the moſt deformed butterflies iſſue from the moſt beautiful aurelias. Some continue in this ſtate ten days, ſome a month, ſome a year. The ſame ſpecies of inſect does not at all times aſſume the ſame hue as an aurelia. In ſome the beautiful gold colour is found; in others it is wanting. It is formed by a beautiful tranſparent brown varniſh, laid on a white ground; the white gleaming through. In this ſtate, the life of the inſect may be retarded or quickened, without injury: the firſt, by preventing the evaporation of its humidity; but, by evaporating its moiſture, in a warm ſituation, the animal aſſumes its winged ſtate before its uſual time.

If ſhut up within a cone, the butterfly always gets rid of the natural internal ſkin of the chryſalis before it eats its way through the cone. To attain this, there ſeems a violent agitation in the humours of the body. Its fluids ſeem driven rapidly through the veſſels; it labours violently with its legs, and ſtruggles to get free. Theſe motions concurring with the growth of the wings and body, the brittle ſkin which covers it at length gives way, by burſting in four diſtinct and regular pieces. The ſkin of the head and legs firſt; then the ſkin at the back diſengages the back and wings. The butterfly, as if fatigued, remains quiet for ſome time, its wings pointed downward, its legs fixed in the ſkin it had juſt thrown off. Its wings take up ſuch little room, one would wonder where they were hidden: but ſoon after they expand ſo rapidly, the eye can ſcarce attend their unfolding; they become five times larger than before, growing thinner as they become broader; all the ſpots and paintings, before ſcarce diſcernible, are proportionably extended; ſo that what ſeemed only confuſed, unmeaning points, now become diſtinct and beautiful ornaments. The wings, ſo ſuddenly extended, appear like wet paper, ſoft, and wrinkled. In half an hour they dry, and their wrinkles diſappear. The butterfly diſcharges three or four drops of a blood-coloured liquid, as the laſt remains of its ſuperfluous moiſture. The exit of aurelias incloſed within a cone, is more difficult, as they have the cone to break through: but this they quickly perform by butts with the head violently againſt it, and probably with their eyes, that are rough and like a file, rubbing the internal ſurface away.

The butterfly needs no other food than the dews of Heaven, and the

the honeyed juices diſtilled from every flower. Thoſe of the warm climates are the largeſt and moſt beautiful.

Butterflies have four wings; and, though two of them be cut off, can fly with the two remaining. They are tranſparent, but rendered opake by the feathery duſt with which they are covered; of different dimenſions and forms, generally ſupported on a footſtalk, regularly laid on the whole ſurface, and of a perfectly beautiful arrangement, like the tiles of an houſe; thoſe of one rank a little covered by thoſe that follow: on one part may be ſeen oval ſtuds; on another, cluſters of ſtuds heart-formed, or long, or triangular; interſperſed with taller ſtuds. The wing is compoſed of ſeveral thick nerves, very ſtrong, though light. The animal ſupports itſelf long in air, although its flight be not graceful. When the butterfly deſigns to viſit a conſiderable diſtance, it aſcends and deſcends; going ſometimes to the right, ſometimes to the left; it flies thus irregularly in purſuit of its mate, which it can diſcover at a mile's diſtance.

The animal may be divided into three parts; the head, the corſelet, and the body. The body is the hinder part compoſed of rings, generally concealed under long hair, with which that part is clothed. The corſelet is more ſolid than the reſt of the body, becauſe the fore wings, and the legs, are fixed therein. The legs are ſix; four only are uſed by the animal; the two fore legs being often concealed in the long hair of the body. Theſe parts internally have the ſame ſet of veſſels in the butterfly as in the caterpillar; but the blood or humours which in the caterpillar circulated from the tail to the head, in the butterfly circulate from the head to the tail.

The eyes of butterflies have not all the ſame form; ſome are large, others ſmall; ſome are the larger portion of a ſphere, others but juſt appearing from the head. In the outward coat of all is a luſtre, offering the colours of the rainbow; it reſembles a multiplying glaſs; having a great number of ſides, or facets, like moſt other inſects.

Leuwenhoek aſſerts there are above ſix thouſand facets on the cornea of a flea. Puget adapted the cornea of a fly to ſee objects through it by means of a microſcope; and nothing could exceed the ſtrangeneſs of its repreſentations: a ſoldier, ſeen through it, appeared an army of pigmies; for it multiplied and diminiſhed objects: the arch of a bridge exhibited a moſt magnificent ſpectacle; and the flame of a candle ſeemed a beautiful illumination.

Butterflies, like moſt flying inſects, have on their heads two feelers,

moveable at their baſe; and having a great number of joints, to turn them in every direction. Thoſe of butterflies are placed at the top of the head, pretty near the external edge of each eye.

The trunk, few inſects of the butterfly kind are without. This is placed exactly between the eyes; and, when not employed in ſeeking nouriſhment, is rolled up, like a curl. A butterfly, when feeding, ſettles on ſome flower; the trunk is then uncurled, thruſt out, and is employed in ſearching the flower to its very bottom, be it ever ſo deep. This trunk conſiſts of two equal hollow tubes, nicely joined to each other, like the pipes of an organ.

But the greateſt number fly by night; theſe are MOTHS. Butterflies fly by day, moths by night. They are diſtinguiſhed by their *antennæ* or feelers: thoſe of the butterfly being clubbed, or knobbed at the end; thoſe of the moth pointed.

The general rule among inſects is, that the female is larger than the male: the male ſmaller and ſlenderer; the female more thick and oval. If they be diſturbed while united, the female flies off with the male on her back, who ſeems entirely paſſive. The females of many moths and butterflies ſeem to have aſſumed their form merely to fecundate their eggs, and lay them. After a junction with the male of about half an hour, they depoſite their eggs, and die: they are impregnated by the male at one aperture, and lay their eggs by another. Their eggs are diſpoſed in the body like a bed of chaplets; when excluded, are whitiſh: ſome oval, ſome round, ſome flatted. The ſhell of the egg, though ſolid, is thin and tranſparent; each egg contains but one caterpillar. The butterfly is careful to place her brood only on plants that afford good nouriſhment to its poſterity; not the plant moſt grateful to itſelf in its winged ſtate, but ſuch as it has fed on, in its reptile form. Theſe eggs are attached to the leaves of the favourite plant, by a ſort of glue; ſometimes round the tender ſhoots of plants, in the form of a bracelet, or a ring, two hundred in each. Some ſecure their eggs, by covering them with hair, plucked from their own bodies, for warmth, and concealment.

All female moths lay their eggs ſhortly after they leave the chryſalis; but many butterflies flutter the whole ſummer without laying, till towards winter: ſome continue the winter in hollows of trees, nor provide for poſterity till the beginning of April, when they leave their retreats, depoſite their eggs and die.

The caterpillar has of all animals the greateſt number of enemies; and exiſts by its ſurpriſing fecundity. Some animals devour them by

hundreds; others, more minute, deſtroy them in various ways: a ſparrow and its mate, that have young, deſtroy three thouſand caterpillars in a week. Some of the caterpillar kind, that ſeem fitted only to eat leaves, will however eat each other; the ſtrongeſt devouring the weak, in preference to their vegetable food. That which lives on the oak, ſeizes its companions, when it can, by the firſt rings, and inflicts a deadly wound; then feaſts in tranquillity on its prey.

Many flies lay their eggs either on or within their bodies; and as theſe turn into worms, the caterpillar nouriſhes a brood of inteſtine enemies, that muſt ſhortly be its deſtruction. "Towards the end of Auguſt," ſays Reaumur, "I perceived a little fly, of a beautiful gold colour, buſily employed on the body of a large caterpillar, of that kind which feeds upon cabbage. I gently ſeparated that part of the leaf on which theſe inſects were placed, from the reſt of the plant, and placed it where I might obſerve them more at my eaſe. The fly, wholly taken up by the buſineſs in which it was employed, walked along the caterpillar's body, now and then remaining fixed to a particular ſpot. Upon this occaſion, I perceived it every now and then dart a ſting, which it carried at the end of its tail, into the caterpillar's body, and then drew it out again, to repeat the ſame operation in another place. It was not difficult for me to conjecture the buſineſs which engaged this animal ſo earneſtly; its whole aim was to depoſite its eggs in the caterpillar's body; which was to ſerve as a proper retreat for bringing them to perfection. The reptile, thus rudely treated, ſeemed to bear all very patiently, only moving a little when ſtung too deeply; which, however, the fly ſeemed entirely to diſregard. I took particular care to feed this caterpillar; which ſeemed to me to continue as voracious and vigorous as any of the reſt of its kind. In about ten or twelve days, it changed into an aurelia, which ſeemed gradually to decline, and died. Upon examining its internal parts, the animal was entirely devoured by worms; which, however, did not come to perfection, as it is probable they had not enough to ſuſtain them within."

The large cabbage caterpillar is ſo ſubject to this injury, that, at certain ſeaſons, it is much eaſier to find them with than without them. The *ichneumon-fly* particularly infeſts theſe reptiles, and is of all others moſt formidable to inſects of various kinds. The ſpider himſelf often falls a prey to the ichneumon, who purſues him to his retreat, deſpiſes his nets, and tears him in pieces, in his own labyrinth. This inſect, redoubtable as the little quadruped that deſtroys the crocodile, has received the ſame name; it depoſits its eggs in the caterpillar's body; ten, fifteen, or twenty.

As

As they are laid in parts not mortal, the reptile ſtill lives and feeds, changes its ſkin; and ſometimes into an aurelia: ſtill the fatal intruders within ſecretly devour its ſubſtance: ſoon after they burſt through its ſkin, and quit it to ſpin themſelves a covering, previous to their own transformation. It is aſtoniſhing ſometimes to ſee the number of worms, the thus iſſue from the body of a ſingle caterpillar, but more that they ſhould devour its entrails, without deſtroying its life: but they feed only on the fatty ſubſtance within the caterpillar's body; and not on its vitals.

THE SILKWORM.

IT is ſuppoſed that ſilkworms were not brought into Europe till the beginning of the twelfth century; when Roger of Sicily brought ſome from Aſia Minor, after his return from the Holy Land, and ſettled them in Sicily and Calabria.

The ſilkworm is a large caterpillar, whitiſh, with twelve feet, and producing a moth. Its cone is formed for its covering while in the aurelia ſtate; the threads of ſeveral of theſe, wound off, and united, form ſtrong and beautiful ſilken threads. Feeding theſe worms, gathering, winding, twiſting, and weaving the ſilk, is a principal manufacture of Europe.

There are two methods of breeding ſilkworms: they may be left at liberty on the trees where they are hatched; or they may be kept in a place built for that purpoſe, and fed every day with freſh leaves. The firſt method is uſed in China, Tonquin, and other hot countries; the other in places where the animal has been artificially propagated, and continues a ſtranger. In the warm climates, the ſilkworm proceeds from an egg, which has been glued by the parent moth on the mulberry-tree, and which remains there during winter. Unaffected by the weather, froſts that kill the tree, injure not the ſilkworm. The inſects never quit the egg till nature has provided a ſupply in the budding leaves for their ſupport; then burſting from their eggs, they crawl on the leaves, and feed voraciouſly. After ſome months feeding, they depoſit on every leaf ſmall cones of ſilk.

But in European climates, the frequent changes of weather, and the hea-

vy dews forbid this method. A room is preferred with a ſouth aſpect; the windows well glazed, the walls well built, the floor exceeding cloſe, ſo as to admit neither air nor inſects. In the middle are four pillars forming a pretty large ſquare. Between theſe are different ſtories made with ozier hurdles; and under each hurdle a floor, with an upright border round, hung on pulleys, placed or taken down at pleaſure. When the worms are hatched, ſome tender mulberry leaves are placed in the paper box in which the eggs were, and which is large enough to hold a number. When they have acquired ſtrength, they muſt be diſtributed on beds of mulberry leaves in the different ſtories. They have a thread by which they can ſuſpend themſelves, to prevent any ſhock by a fall. Freſh leaves muſt be brought every morning, and ſtrewed very gently and equally over them; the ſilkworms will forſake the old leaves. The leaves muſt be gathered when the weather is dry, and kept dry, if a ſtore be neceſſary. To give them air, open their chamber windows, when the ſun ſhines warmeſt.

The worm, when it burſts the ſhell, is extremely ſmall, and black; but the head more ſhining black than the body: ſome days after, they begin to turn whitiſh, or grey. The inſect throws off its ſkin, and appears clothed anew ſeveral times. When ready to aſſume the aurelia form, the animal forſakes, for the laſt time, all food and ſociety, and prepares its cone, or ball of ſilk, which is ſpun from two little longiſh kinds of bags that lie above the inteſtines, and are filled with a gummy fluid, of a marigold colour. The little animal is furniſhed with a ſurpriſing apparatus for ſpinning it to every degree of fineneſs, ſomewhat like a wire-drawer's machine. The threads proceed from two gum bags, each ſupplying its own. The thread is flatted on one ſide, and grooved along its length; ſeeming as if doubled juſt on leaving the body, and that the two threads ſtick to each other by their gummy quality. Previous to ſpinning, the ſilkworm ſeeks a convenient place to erect its cell. When it has found a leaf or chink to its purpoſe, it wreathes its head in every direction, and faſtens its thread on every ſide. Though its firſt eſſays ſeem confuſed, yet they are not without deſign: the firſt threads being thrown at random, to ſerve as a ſhelter againſt rain; for nature having appointed the animal to work on trees in the open air, its habits remain, though it is brought up in a warm apartment. It is compoſed externally of a kind of rough cotton-like ſubſtance, called floſs; within the thread is more diſtinct and even; and next the aurelia, the apartment ſeems lined with a paper-like ſubſtance, but of ſtronger conſiſtence The thread lies very irregularly, and winds off now from one ſide

ſo

of the cone, then from the other. This whole thread, if meaſured, is about three hundred yards long; and ſo very fine, that eight or ten are generally rolled into one by manufacturers. The cone is in form like a pigeon's egg, moſt pointed at one end, where the head of the aurelia generally is; and here the inſect, when a moth, burſts through. After a fortnight or three weeks the aurelia becomes a moth; when free from its confinement, it appears exhauſted with fatigue, and ſeems produced only to tranſmit a future brood. It neither flies nor eats; the male only ſeeking the female: their union continues for four days; the male dies immediately after ſeparation; and ſhe ſurvives him only till ſhe has laid her eggs, which are not hatched into worms till the enſuing ſpring.

As their burſting through the cone deſtroys the ſilk, the manufacturers kill the aurelia, by expoſing it to the ſun, before the moth comes to perfection, and throw the cones into warm water, till the firſt thread offers them a clue for winding all off. They generally take eight of the ſilken threads together; the cones ſtill kept under water, till a proper quantity of the ſilk is wound off: they do not take all; for the latter parts grow weak and bad. The paper-like ſubſtance which remains, ſome ſtain with a variety of colours, to make artificial flowers; others let it lie in the water, till the glutinous matter which cements it is diſſolved: then carded like wool, and ſpun with a wheel, it is converted into ſilk ſtuffs of an inferior kind.

THE

FOURTH ORDER OF INSECTS.

IN this claſs of inſects we place a various tribe, firſt laid as eggs, then excluded as maggots or grubs, then changed into aurelias, with their legs and wings not wrapped up, but appearing; and, laſtly, aſſuming wings, in which ſtate they propagate. Some of theſe have four tranſparent wings, as bees; ſome two membranous caſes to their wings, as beetles; ſome but two wings, which are tranſparent, as ants. We include the bee, the waſp, the humble bee, the ichneumon-fly, the gnat, the tipula or longlegs, the beetle, the may-bug, the glow-worm, and the ant.

THE BEE.

TO give a complete hiſtory of this inſect, whoſe nature and properties ſtill continue in diſpute, is impoſſible. The account given by Reaumur is ſufficiently minute, and wonderful; but many of the facts he relates, are doubted, ſome denied, though it is not eaſy to diſprove them, nor effectively to contradict the aſſertions of a man whoſe life was ſpent in this ſtudy. That he might err is poſſible, that he erred wilfully none aſſert; and ſince his time, none have offered as guides, in whom we may place greater confidence.

There are, ſays Reaumur, three different kinds of bees: firſt, the labouring bees, which are the greateſt number, and neither male or female: ſecondly, drones: of a darker colour, longer, and thicker by one third than the former: they are the males; and there is not above a hundred of them, in a hive of ſeven or eight thouſand bees: thirdly, a larger ſtill, and in number fewer; being but one in every ſwarm: but later obſervers mention there being ſometimes five or ſix in the ſame hive. Theſe are called queen-bees, and are ſaid to lay all the eggs from which the ſwarm is hatched.

In the common working bee, the firſt remarkable part is the trunk,

which extracts the honey from flowers. It is formed like a beſom, to ſweep, or a tongue, to lick it away. The teeth ſerve in making wax. This is gathered from flowers, like honey; and is that duſt or *farina* which fecundates plants: it is molded into wax by the little animal at leiſure. A bee enters the cup of a flower, particularly if charged with this yellow farina. Being covered with hair, it rolls itſelf in the flower, till quite covered with duſt, which it bruſhes off with its two hind legs, and kneads into two little balls. In the thighs of the hind legs are two cavities, edged with hair; into theſe the animal ſticks its pellets. Thus employed, the bee flies from flower to flower, increaſing its ſtore, and adding to its ſtock of wax; until the ball upon each thigh becomes as big as a grain of pepper: when having got a ſufficient load, it returns to the hive.

The belly of the bee is divided into ſix rings, which ſometimes ſhorten the body, by ſlipping one over the other. It contains, beſide the inteſtines, the honey-bag, the venom-bag, and the ſting. The honey-bag is tranſparent, receives the honey the bee has collected, of which the greater part is carried to the honey-comb; the remainder ſerves for nouriſhment: for, during ſummer, it never touches what has been laid up for winter. The ſting is compoſed of three parts; the ſheath, and two darts, extremely ſmall and penetrating, having ſeveral ſharp points or barbs, which render the ſting more painful. The ſheath, which has a ſharp point, makes the firſt wound; this is followed by the darts, and then the venom is poured in. The ſheath ſometimes ſticks ſo faſt in the wound, that it is left behind; by which the bee ſoon after dies, and the wound is conſiderably enflamed. Without a ſting this little animal would have too many plunderers, and lazy animals, fond of honey, would intrude on the ſweets of the hive.

All its proviſions are laid up for the community; all its arts in building are for poſterity. Bees build their cells with wax, faſhioned into convenient apartments. When they begin to work, they divide themſelves into four companies: one roves the fields in ſearch of materials; another lays out the bottom and partitions of their cells; a third ſmoothens the inſides from corners and angles; the fourth bring food, or relieve thoſe who return with their burthens. They often change taſks; thoſe at work, go abroad; and thoſe from the fields take their places. When any one wants food, it bends down its trunk to the bee from whom it is expected, which then opens its honey-bag, and lets ſome drops fall

into the other's mouth, which is opened to receive it. In a day's time, they make cells, upon each other, to contain three thouſand bees.

The cells are perfect hexagons: double, opening on either ſide, and cloſed at the bottom. Theſe lodgings have ſpaces, like ſtreets, between them, large enough to give the bees free paſſage; yet narrow enough to preſerve the neceſſary heat. The mouth of every cell is ſtrengthened by a border, which makes the door a little leſs than the inſide of the cell. Theſe cells contain their young, their wax, or their honey. It is their principal care, when firſt hived, to ſtop up all the crannies, by a reſinous gum, more tenacious than wax, called *Propolis*. When the bees begin to work with it it is ſoft, but acquires a firmer conſiſtence every day; till at length it aſſumes a brown colour, and becomes much harder than wax. The bees carry it on their hinder legs; and ſome think it is met with on the birch, the willow, and poplar.

By their teeth they model their various buildings; they begin at the top of the hive, and ſeveral at a time. Their combs coſt them great labour, and are made by inſenſible additions. Every worm, before it is an aurelia, hangs its old ſkin around its cell: the ſame cell is often tenanted by three or four worms in a ſummer; and the next ſeaſon, by three or four more: thus being lined, ſix or eight deep, it becomes at laſt too narrow for a new brood, and is converted into a ſtore-houſe for honey.

The meal of flowers, of which their wax is formed, is one of their moſt favourite repaſts. On this they live during ſummer; and lay up a large winter proviſion of it: this is the bee-bread; without which they ſtarve. Their wax is this meal digeſted, and wrought into a paſte. In April and May, the bees are buſy, from morning to evening, in gathering this meal; but when the weather becomes too hot in the midſt of ſummer, they work only in the morning.

The bee has a ſtomach for wax, as well as honey; in which the powder is altered, digeſted, and concocted into wax, then it is ejected. A comb, newly made, is white: it becomes yellow as it grows old, and almoſt black when kept long. Honey is extracted from that part of the flower called the nectarium. It paſſes into the firſt ſtomach, or honey-bag, which appears like an oblong bladder.

How numerous ſoever is a ſwarm, all owe their original to the queen-bee: that in one ſummer gives birth to twenty thouſand young: the number of her eggs appearing at one time amounts to five thouſand. She may eaſily be diſtinguiſhed by her ſize, and the ſhape of her body. She will be ſeen at times attended with a numerous retinue, marching from

from cell to cell, plunging the extremity of her body into many of them, and leaving one ſmall egg in each; if ſhe leave two, the latter is removed. The bees which compoſe her train are thought to be males. Theſe are larger and blacker than common bees; without ſtings, and without induſtry. They ſeem formed only to tranſmit a poſterity. If their queen die, the bees leave off working, and take no farther care. If another queen is preſented them, they acknowledge her for ſovereign, and apply to their labour.

This fertility of the queen-bee, and the great attentions paid to her, are controverted by more recent obſervers. They aſſert, that the common bees are parents themſelves; that they depoſite their eggs in the cells which they have prepared, and bring forth a progeny wholly their own.

The egg is fixed to the bottom of the cell, in a ſingle point. A day or two after it is depoſited, the worm is excluded like a maggot rolled up, and lying ſoftly on a bed of a whitiſh coloured jelly, on which it begins to feed. The working bees attend it with the moſt anxious tenderneſs; and furniſh it every hour with a ſupply of this whitiſh ſubſtance, which is a compoſition of honey and wax in their own bowels. The worm in leſs than ſix days comes to full growth, and lining the walls of its apartment with a ſilken tapeſtry, which it ſpins in the manner of caterpillars, ſoon becomes an aurelia, exhibiting legs and wings of the future bee. In about twenty or one and twenty days the bee is completely formed, and opens its priſon, by piercing with its teeth the waxen door that confines it; but is yet moiſt, and incommoded: the bees flock round it, and lick it clean with their trunks; while others feed it with honey: others cleanſe the cell that has been juſt left, for a new inhabitant. The young bee quickly repays their care by its induſtry; for as ſoon as its external parts are dry, it begins the taſk, which it purſues unremittingly. Inſtructed only by nature, it goes in queſt of flowers, chooſes only thoſe that yield it a ſupply, rejects ſuch as are barren of honey, and, when loaded, returns to the common habitation; then it gathers the mealy powder of the flower, which is converted into wax; and the very firſt day returns with large balls in its thighs.

Above a hundred are excluded in one day; and often they are ſcarcely excluded, when they are obliged, by the old bees, to ſeek new habitations; even notwithſtanding their reſiſtance, ſhould they attempt it. In different countries, theſe ſwarms or colonies appear at different times of the year. The night before, an unuſual buzzing is heard in the hive; all labour is diſcontinued; every bee is either employed in forcing, or reluctantly

luctantly yielding a ſubmiſſion: at length, after ſome tumult, a queen bee is choſen, to attend the young colony, which crowding round their protectreſs, ſets off. The uſual time of ſwarming is from ten in the morning to three in the afternoon, when the ſun ſhines bright. They flutter a while, and ſometimes undertake a diſtant journey, but more frequently ſeek ſome neighbouring aſylum. In countries, where the bees are wild, and unprotected by man, they build their waxen cells in the hollow of a tree; but with us they ſeem improvident in their choice, and the firſt green branch that ſtops their flight, ſeems to be thought ſufficient for their abode. When the queen is ſettled, the reſt of the ſwarm ſoon follow. Sometimes there are two or three queens to a ſwarm, and the colony is divided into parties; the bees, by degrees, deſert the weakeſt for the moſt powerful protector. The deſerted queen takes refuge under the new monarch, and is ſoon deſtroyed. If there ſhould be a queen bee, belonging to the new colony, left in the old hive, ſhe always ſuffers the fate of the former, unleſs the hive be full of wax and honey.

At the latter end of the ſummer, when the colony is ſufficiently ſtored with inhabitants, a moſt cruel policy enſues. The drone bees, who had hitherto led a life of indolence and pleaſure, impregnating the queen, and rioting on the labours of the hive, now fall a ſacrifice to the general reſentment of the working bees, which declare war againſt them; and in two or three days the ground round the hive is covered with their bodies. They even kill ſuch drones as are yet in the worm ſtate in the cell, and eject their bodies.

Sometimes upwards of forty thouſand bees are found in a ſingle hive. In leſs than twenty-four hours they make combs twenty inches long, and ſeven or eight broad. Sometimes they will half fill their hives with wax in leſs than five days. In the firſt fifteen days they always make more wax than they do during the reſt of the year.

In ſome parts of France and Piedmont, and Egypt, they have a kind of floating bee-houſe, well defended from accidental ſtorms, and floating gently along the river. As the bees are continually chooſing freſh flowery paſture along the banks, they are furniſhed with ſweets before unrifled.

There are two kinds of honey, the white and the yellow. The white is taken without fire from the honey-combs. The yellow is extracted by heat, and ſqueezed through bags in a preſs. The beſt honey is new, thick, and granulated, of a clear tranſparent white colour, of a ſoft and aromatic ſmell, and of a ſweet lively taſte. Honey made in mountainous countries, is preferable to that of the valley: honey made in the

the ſpring, to that gathered in ſummer; which yet is more valuable than that of autumn.

In Guadaloupe, the bee is leſs by half than the European, and blacker and rounder; has no ſting, and makes cells in hollow trees: if the hole is too large, the bees form a ſort of waxen houſe, pear-ſhaped; in this they lodge, ſtore their honey, and lay their eggs. They lay up their honey in waxen veſſels, the ſize of a pigeon's egg, black or deep violet colour; and ſo jointed together, that there is no ſpace between them. The honey never congeals, but is fluid, of the conſiſtence of oil, and amber coloured. There are found little black bees, without a ſting, reſembling theſe, in all tropical climates; and though theſe countries have bees, like our own, yet thoſe form the moſt uſeful tribe in thoſe parts. Their honey is more palatable, and leſs ſurfeiting than ours; the wax is ſo ſoft, that it is only uſed for medical purpoſes, not being hard enough to form candles.

Of inſects that receive the name of bees there are ſeveral. The Humble-Bee is the largeſt, equalling the firſt joint of the middle finger. Theſe are ſeen in every field and flower. They build in holes in the ground, of dry leaves, mixed with wax and wool, defended with moſs. Each makes a ſeparate cell, about the ſize of a ſmall nutmeg, round and hollow, containing the honey in a bag. Several of theſe cells are joined, ſo that the whole appears like a cluſter of grapes. The females, which have the appearance of waſps, are few; their eggs are laid in cells, which the reſt ſoon cover with wax. Uncertain whether they have a queen; but one is much the largeſt, without wings or hair, all black like poliſhed ebony. This views the works, from time to time, and enters the cell, as if to ſee whether every thing is right. In the morning, the young humble-bees are idle, and not inclined to labour, till one of the largeſt thruſts half its body from a hole on the top of the neſt, beats its wings, buzzing till the colony is in motion. The humble-bees gather honey, but not ſo fine, or good, as the common bees, nor the wax ſo clean, or capable of fuſion.

The Wood Bee is larger than the common queen-bee; blueiſh black, ſmooth and ſhining; appears at the approach of ſpring, flying near walls of a warm aſpect. This bee makes its neſt in ſome half-rotten piece of wood, which it ſcoops for its purpoſe; never in ſtanding trees. The holes turn to one ſide; their opening is ſufficient to admit a finger, from whence runs the inner apartment, generally twelve or fifteen inches long. Their teeth bore theſe cavities; they uſually branch into three

or four apartments: in each they lay eggs, to the number of ten or twelve, each ſeparate and diſtinct; the egg is involved in a ſort of paſte, at once the young animal's protection and nouriſhment. The grown bees feed on ſmall inſects, particularly a very ſmall louſe, of a reddiſh brown colour.

Mason-Bees make their cells with a ſort of mortar, made of earth; they build againſt a wall expoſed to the ſun. The mortar, which at firſt is ſoft, ſoon becomes as hard as ſtone, and in this their eggs are laid. Each neſt contains ſeven or eight cells, an egg in every cell, placed regularly one over the other. If the neſt remains unhurt, or wants but little repairs, they uſe it the year enſuing; and often three or four years. A worm with very ſtrong teeth is often found to bore into their little fortifications, and devour their young.

The Ground-Bee builds in the earth, in round holes, five or ſix inches deep; the mouth narrow, juſt ſufficient to admit the little inhabitant. They carry out all the earth, grain by grain, to the mouth of the hole, where it forms a little hillock. Sometimes the walks of a garden are undermined by their labours; ſome of the holes running directly downward, others horizontally beneath the ſurface. They lay up in theſe cavities proviſions for their young, which conſiſt of a paſte that has the appearance of corn, and is ſweetiſh.

Leaf cutting-Bees make their neſt and lay their eggs among bits of leaves very artificially placed in holes in the earth, of about the length of a tooth-pick caſe. They make the bits of leaves roundiſh, and with them line the inſide of their habitations. This is further lined by a reddiſh kind of paſte, ſomewhat ſweet or acid. Theſe bees are of various kinds; thoſe that build their neſts with cheſtnut-leaves are as big as drones, but thoſe of the roſe-tree are ſmaller than the common bee.

Wall-Bees make their neſts in walls, of a kind of ſilky membrane, with which they fill up the vacuities between the ſmall ſtones which form the ſides of their habitation. Their apartment conſiſts of ſeveral cells, placed end to end, each in the ſhape of a thimble. The web which lines this habitation is thick, warm, tranſparent, and whitiſh, ſuppoſed to be ſpun from the animal's body; the males and females are of a ſize, but the former are without a ſting.

To theſe varieties of the bee kind might be added ſeveral others, which, though different, are not ſufficiently diſtinguiſhed for particular notice.

THE

THE WASP.

THE waſp is winged; a ſting in its tail; is longer in proportion than the bee; marked with bright yellow circles round its body; ſwift and active. On each ſide the mouth this animal has a long tooth, notched like a ſaw; with theſe it cuts. Waſps live in community, ſometimes ten or twelve thouſand together; fierce, voracious, and dangerous, when enraged. Wherever fleſh is cutting up, they gorge themſelves with the ſpoil, and fly to their neſts with their reeking prey. They make war on every other fly, and the ſpider himſelf dreads their approaches.

Waſps have ſimilar occupations to bees for propagation, for nurſing and ſupporting the riſing progeny. Among bees is one queen, or two in a hive; among waſps two or three hundred. Waſps are very numerous in ſummer, employed in gathering proviſions for their neſt, if made, or in making one. The neſt is contrived very artificially. Their principal care is to ſeek a hole, begun by ſome animal, a field mouſe, a rat, or a mole. They ſometimes build on the plain, where dry, but commonly on the ſide of a bank to avoid water. Their firſt labour is to enlarge the hole, carrying off the earth. They are furniſhed with a trunk above their mouths, two ſaws on each ſide, which play to the right and left againſt each other, and ſix ſtrong muſcular legs. They cut the earth with their ſaws, and carry it out with their legs. The outline of their habitation makes a cavity of about a foot and a half every way. While ſome are working, others are roving the fields to ſeek materials. To prevent the earth from falling down, they make a ſort of roof with their glewy ſubſtance, to which they fix the rudiments of their building, working from the top downwards, as if hanging a bell, which they cloſe at bottom. They build their neſts of wood and glew. Theſe they ſaw, and divide the wood into ſmall fibres, of which they take up little bundles in their claws, letting fall on them a few drops of glewy matter with which their bodies are provided, by which they knead the whole into a paſte. This they tread cloſe with their feet, and trowel with their trunks, going backwards as they work. Having repeated this operation three or four times, the compoſition is flatted out into a ſmall grey leaf, much finer than paper, and pretty firm; with this, placing layer upon layer, they ſtrengthen every partition. They make another entrance to their habitation, either for letting in the warmth of the ſun, or for eſcape. By one of theſe they

always enter, by the other they ſally forth; each being ſmall, but one can paſs at a time.

The honey-comb of the waſp is flat, the mouth of every cell downwards. Thus is their habitation contrived, ſtory above ſtory, ſupported by ſeveral rows of pillars which give firmneſs to the building, while the upper ſtory is flat-roofed and ſmooth. The pillars are very hard and compact, largeſt at each end. The cells are for the reception of young, being replete with neither wax nor honey. Each cell is hexagonal; but they are of two ſorts, the one larger for the production of the male and female waſps, the other leſs for the reception of the working part of the community. The females lay their eggs, one in each cell, and ſtick it in with a kind of gummy matter. This egg produces the inſect in its worm-ſtate, which the old females feed till it becomes large. The young worms at a certain ſize ſpin a very fine ſilk. After this they diveſt themſelves of their ſkins by the uſual mode of transformation, the aurelia by degrees is emancipated from its ſhell, thruſts out its legs and wings, and acquires the colour and ſhape of its parent.

Though it gathers no honey, no animal is more fond of ſweets. It will purſue the bee and the humble-bee, deſtroy them with its ſting, and plunder them of their honey-bag, with which it flies triumphantly loaded to its neſt: but fierce battles ſometimes enſue, in which the bees make up by conduct and numbers what they want in proweſs. When there is no honey to be had, they ſeek the beſt and ſweeteſt fruits. From the garden they fly to the city, to the grocers ſhops, and butchers ſhambles. They will ſometimes carry off bits of fleſh half as big as themſelves, with which they fly to their neſt. Whenever they are found, other flies deſert the place immediately.

Every day in ſummer adds to their numbers; and from their ſtrength, agility, and indiſcriminate appetite, were they as long lived as the bee, they would ſoon ſwarm on the face of nature the moſt noxious of plagues: but they live only a ſingle ſeaſon. While ſummer heats continue, they are bold, voracious, and enterpriſing: as the ſun withdraws, they loſe their courage and activity; as the cold increaſes, they become more domeſtic; ſeldom leave the neſt, make but ſhort adventures, flutter about at noon only, and return chilled and feeble. No longer able to provide their growing progeny a ſupply, they ſacrifice them all to the neceſſity of the times; then forſaking their neſts, they ſeek warmth in the corners of houſes, and artificial heat; but before the new year they wither and die; the working waſps firſt, the males following, and many of the females. One or two females ſurvive the winter, and having been impregnated

pregnated during the preceding ſeaſon, in ſpring each lays eggs in a little hole of her own contrivance. This bundle of eggs, which is cluſtered like grapes, produces two worms; theſe, when hatched, give aſſiſtance to the female, who is employed in hatching two more; theſe gathering ſtrength, extricate themſelves from their web, and become aſſiſtants: fifteen days after, two more appear; thus the community daily increaſes. The female lays in every cell a male and female: theſe ſoon breed in turn, till, from a ſingle female, ten thouſand waſps are produced before June. Afterwards they aſſemble in the middle of ſummer, and provide for themſelves the large and commodious habitation we have deſcribed.

In the principal ſpecies of the SOLITARY WASP, the inſect is ſmaller than the working waſp. The filament, by which the corſelet is joined to the body, is longer and more diſtinct, and the inſect blacker than in the ordinary kinds. From May to July, this waſp is moſt diligently employed, in contriving and fitting up a commodious apartment for its young, which is not to ſucceed it till the year enſuing, with unwearied aſſiduity boring a hole into the fineſt earth ſome inches deep, but not wider than its own body. This gallery leads to a wider apartment for lodging its young. It always chooſes a gravelly ſoil, where the earth is almoſt as hard as ſtone, digging and hollowing this apartment by no ſmall labour. This inſect has two teeth, ſtrong and firm, but not extremely hard: to ſoften that earth it is unable to pierce, it has a gummy liquor, which, emitted on the place, renders it more eaſily ſeparable, and the whole becomes a kind of ſoft paſte. If the animal's liquor is exhauſted, water from ſome neighbouring flower or ſtream ſupplies the deficiency. After much toil, a hole ſome inches deep is formed, at the bottom of which is a large cavity: to this what other inſect would venture, conſidering the length and narrowneſs of the defile? Here the ſolitary waſp lays its egg; and the naſcent animal continues above nine months, unattended and immured. The mother-waſp's next care is to furniſh proviſions to the young inſect when it leaves the egg. She procures little green worms, generally from eight to twelve: this ſupply laid in, ſhe cloſes the mouth of the paſſage, and dies, ſatisfied with having provided for her future progeny. The diminutive young glutton, juſt hatched, feaſts on the living ſpoil without any control, till its ſtock of worms is exhauſted, and the time of its transformation approaches; then ſpinning a ſilken web, it continues fixed in its cell till the ſun calls it from its dark abode the enſuing ſummer.

Weſt Indian waſps are thicker, and twice as long as the common bee; grey ſtriped with yellow, and have a very dangerous ſting. Their cells reſemble a honey-comb, in which the young ones are bred. They hang their neſts by threads, compoſed of the ſame ſubſtance with the cells, to the branches of trees, and the eaves of houſes, in great abundance, deſcending like pears, of which ſhape they are, and as large as one's head. The inſide is divided into three round ſtories, full of hexagonal cells. In ſome iſlands theſe inſects are ſo numerous, that their neſts are ſcarce two feet aſunder, and ſometimes no precautions can prevent their attacks: the pain of their ſting is almoſt inſupportable; the whole viſage ſwells, and the features are ſo diſfigured, that a perſon is ſcarcely known by his moſt intimate acquaintance.

THE ICHNEUMON FLY.

THE ichneumon fly (of which there are many varieties) fears not the waſp itſelf, but enters its retreats, plunders its habitations, and takes poſſeſſion of its cell for its own young. The moſt formidable, and beſt known, is the common ichneumon, with four wings like the bee, a long ſlender black body, a three-forked tail, conſiſting of briſtles; the two outermoſt black, the middlemoſt red. This inſtrument is a weapon of great force and efficacy; ſcarce any ſubſtance it will not pierce. This is employed in deſtroying its prey, and by this the animal depoſits her eggs. The male has no ſuch ſting; the female uſes it with great force and dexterity, brandiſhing it from ſide to ſide, and often wounding thoſe who thought they held her ſecurely.

All this tribe owe their birth to the deſtruction of ſome other inſect, within whoſe body they have been depoſited, and upon whoſe vitals they have preyed. The caterpillar, the gnat, and even the ſpider, ſo formidable to others, is often their unwilling foſterer. About the middle of ſummer, when inſects are abundant, the ichneumon is ſeen flying buſily about, and ſeeking proper objects of various kinds, upon whom to depoſe its progeny. Some place their eggs in the aurelia of ſome naſcent inſect, others in the neſt of the waſp; and as both are produced at the ſame time, the young ichneumon not only devours the young waſp, but

The Ant

Magnified.

but its whole ſupply of worms. But the greater number of the ichneumon tribe are produced from the back of the caterpillar; and if it ſurvives the worm ſtate, they change into a chryſalis, encloſed in its body. Such is this fly, very terrible to the inſect tribe, but of infinite ſervice to mankind. The millions it kills in a ſummer are inconceivable. Without ſuch a deſtroyer, the fruits of the earth would only furniſh a banquet for the inſect race.

THE ANT.

IT is ſomewhat ſurpriſing, that almoſt every writer of antiquity ſhould deſcribe this inſect as labouring in the ſummer, and feaſting upon the produce during winter. It ſhould ſeem, therefore, that in the warmer climates, where winter is mild and ſhort, this occurs; but in France and England they are torpid.

ANTS are of two or three kinds; ſome red, ſome black, ſome with ſtings, and others without. By their ſtings ſome inflict wounds; others ſpurt from their hinder parts an acid pungent liquor, which inflames and burns the ſkin like nettles.

An ant is divided into the head, breaſt and belly. In the head, are the eyes, black: under the eyes two ſmall horns or feelers, of twelve joints, covered with a fine ſilky hair. The mouth has two crooked jaws, projecting outwards, ſerrated like teeth. The breaſt is covered with fine ſilky hair; from it project ſix legs, ſtrong and hairy, their extremities armed with two ſmall claws, which the animal uſes in climbing. The belly reddiſh, the body brown cheſtnut colour, ſhining, and covered with extremely fine hair. This animal is bold and active, and fears not to attack creatures ten times its own magnitude. In the firſt fine day of April, the ant-hill ſwarms with life, and myriads awaking from their annual lethargy, prepare for the occupations of the ſeaſon. At firſt none but the wingleſs tribe appears; theſe are the working ants: the males and females, that have four large wings, are ſlower in their appearance. Thus, like bees, they are divided into males, females, and neutrals. The females are much the largeſt; the working ants the ſmalleſt. The female alſo differs by the colour and ſtructure of her breaſt, which is a little browner than the common ant, and brighter than the male. In eight or ten days after their appearance, their labours are in ſome forwardneſs.

wardneſs. The males partake not in the drudgeries of the ſtate, but purſue the females with great aſſiduity.

In England, ant-hills are formed with but little regularity. In the ſouth of Europe they offer a ſight highly worthy curioſity. They are generally in the neighbourhood of ſome large tree and a ſtream of water. The firſt, as a proper place for getting food; the other, for ſupplying moiſture. The ant-hill reſembles a ſugar-loaf in ſhape, three feet high, compoſed of leaves, wood, ſand, earth, gum, and grains of corn, united compactly, with galleries to the bottom, and winding ways within. To the water, and to the tree, are many paths worn by conſtant aſſiduity; along theſe the buſy inſects paſs and re-paſs continually from May till the autumnal bad weather.

Their chief employment is procuring a ſufficiency of food for all the community. They live on various proviſion, ſmall inſects, ſweets of all kinds. They ſeldom think of the community, till themſelves are firſt ſatiated. Having found a juicy fruit, they ſwallow what they can, then tearing it in pieces, carry home their load. If they meet with an inſect above their match, ſeveral will fall on it at once, and each will carry off part of the ſpoil. If they meet any thing that is too heavy for one, ſeveral will unite their force, ſome dragging, others puſhing. If one makes a lucky diſcovery, it will give advice to others, and the whole republic will put themſelves in motion at once. If one is killed, ſome will carry him off to a great diſtance, to prevent obſtruction to the general ſpirit of induſtry.

After a few days of fine weather, the female ants lay their eggs. They are carried, as ſoon as laid, to the ſafeſt ſituation at the bottom of their hill. The egg is ſo very ſmall, that, though laid on a black ground, it can ſcarcely be diſcerned. If viewed through a microſcope, it appears ſmooth, poliſhed, and ſhining; the maggot is compoſed of twelve rings, is often larger than the ant itſelf, and found frequently as a white ſubſtance in every ant-hill. In cold weather they take them in their mouths to the very depths of their habitation; in a fine day they remove them, with equal care, nearer the ſurface, for the warm beams of the ſun. If a formidable enemy ſhould come to attack their habitation, their firſt care is to ſave their offspring, each loaded with a young one, often bigger than the inſect that ſupports it.

When the young maggot acquires its full growth, it becomes an aurelia, which repreſents diſtinctly the parts of the animal, though without motion, and wrapped up. After all its changes, it burſts this laſt ſkin,

to

to aſſume the form it is to retain. The old ones very aſſiduouſly break open with their teeth the covering in which it is incloſed; knowing the preciſe time for their aſſiſtance: if produced too ſoon, the young one dies of cold; if retarded too long, it is ſuffocated.

When the female has done laying, her wings drop off; but the males, having no longer any occupation at home, uſe their wings, and fly away.

The working ants prepare for winter, and bury their retreats deep; their ſtock of corn, and other ſubſtances, ſerve as fences to keep off the rigours of the weather in our cold climates, not as proviſions, they being torpid: but whether without any intervals may be queſtioned. What has been ſaid miſtakenly of our European ant, is true of thoſe in tropical climates. They build hills with great contrivance and regularity, lay up proviſions, probably live the whole year, and ſubmit to regulations unknown among the ants of Europe.

In Africa are ſome ants white, others red, green, or black; the latter exceed an inch long, in every reſpect formidable. Their ſting is extremely painful, and their depredations ſometimes extremely deſtructive. Their hill is from ſix to twelve feet high, made of viſcous clay, tapering pyramidally, conſtructed with great artifice; the cells ſo numerous and even, a honey-comb ſcarce exceeds them in number and regularity. The inhabitants ſeem to be under ſtrict regulation. At the ſlighteſt warning they ſally out on whatever diſturbs them. Sheep, hens, rats, and even large animals, are deſtroyed by theſe mercileſs inſects, and their fleſh devoured to the bone. No anatomiſt in the world can ſtrip a ſkeleton ſo clean; no animal, how ſtrong ſoever, when once ſeized, has power to reſiſt them. When they ſally forth, fifty or ſixty larger than the reſt head the band, and conduct them. If they have a fixed ſpot where their prey continues to reſort, they form a vaulted gallery, ſometimes a quarter of a mile in length; and yet they will hollow it out in the ſpace of ten or twelve hours.

The millions of theſe inſects, their voracity, their union, and management, far exceeds what we can conceive: but by ſuppoſing our ants enlarged in ſize and powers, and increaſed in numbers, ſo that a train might be a mile long, and very broad, we may form ſome idea of the African termites, and the South American troops of inſect depredators, from which ſcarce any living thing can eſcape but by flight.

THE BEETLE.

OF the BEETLE are various kinds; all having caſes to their wings, which are the more neceſſary, as they live under the earth in holes which they dig, to prevent the injuries of their real wings, which they keep clean and even: they produce a buzzing noiſe, when the animal flies. Bulk for bulk, theſe inſects are a thouſand times ſtronger than man. Some beetles are not larger than the head of a pin, others as big as one's fiſt: ſome are produced in a month, and in a ſingle ſeaſon go through all the ſtages of their exiſtence; others take near four years to their completion, and live as winged inſects another year.

The MAY-BUG, or DORR-BEETLE, has caſes of reddiſh brown colour, ſprinkled with whitiſh duſt, which eaſily comes off. Of ſome the necks are covered with a red plate, others with a black. The fore legs are very ſhort, for burrowing in the ground, where it retreats. Is well known for its evening buzz; has been known to ſwarm in ſuch numbers, as to eat up every vegetable production. The ſexes are diſtinguiſhed by the ſuperior length of the tufts at the end of the horns, in the male. They unite in ſummer. The female bores a hole in the ground, to depoſite her burthen, half a foot deep; here ſhe places her eggs, one by the other. They are oblong, bright yellow. She aſcends from her hole, to live as before, on leaves and vegetables, to buzz in the evening, and to lie hid, among the branches of trees, in the heat of the day. In three months the egg vivifies, the inſect breaks its ſhell, and a ſmall grub or maggot crawls forth; it continues in the worm ſtate more than three years, devouring the roots of plants, and making its way under ground: they grow to the ſize of a walnut, being a great whitiſh yellow maggot with a red head, found frequently in new turned earth, and eagerly ſought after by birds. The body conſiſts of twelve ſegments or joints, on each ſide of which are nine breathing holes, and three red feet. The head is large, reddiſh, a pincer before, and ſemicircular lip, with which it cuts the roots of plants, and ſucks their moiſture. It has no occaſion for eyes, and has none, but two feelers ſerve to direct its motions. It yearly changes its ſkin.

In the fourth year, about the latter end of autumn, the grub approaches its transformation, buries itſelf, ſometimes ſix feet beneath the ſurface, and forms

forms a capacious apartment, which it renders very ſmooth by the excretions of its body. It begins ſoon after to ſhorten, ſwells, and burſts its ſkin, to become a chryſalis, at firſt yellowiſh, but at laſt nearly red. After three months, in January, the chryſalis becomes a winged inſect, but continues feeble and ſickly. Its parts are ſoft, and its voracious nature ſuſpended. In May it burſts from the earth, the firſt mild evening, to viſit the ſoftneſs of the ſummer air, to chooſe the ſweeteſt vegetables, and to drink the dew of the evening, buzzing along by thouſands, and hitting every object that intercepts their flight. At mid-day they lurk under leaves and branches, the willow particularly, in cluſters. They never ſurvive the ſeaſon. They unite ſpeedily.

The female bores a hole in the ground, with an inſtrument at the tail, and depoſites her eggs. This inſect, in its worm ſtate, makes one of the chief repaſts of the feathered tribe, and generally the firſt nouriſhment with which they ſupply their young. Rooks and hogs are particularly fond of theſe worms. Of all the beetle kind this is the moſt numerous, and may ſerve as a ſpecimen of the reſt; but all are not ſo long in the worm ſtate, a ſingle year ſufficing.

That beetle which the Americans call the TUMBLE-DUNG, is black, rounder than moſt, and ſo ſtrong, though not much larger than the common black beetle, that if one of them be put under a braſs candleſtick, it will move it backwards and forwards, as if by an inviſible hand, to the admiration of thoſe not accuſtomed to the ſight; their excellent ſmelling directs them in flights to excrements juſt fallen from man or beaſt, on which they inſtantly drop, forming round balls or pellets, in which they lay an egg. Theſe pellets, in September, they convey three feet deep in the earth, where they lie till ſpring; when the eggs are hatched, the neſts burſt, and the inſects appear. They aſſiſt each other with indefatigable induſtry, in rolling theſe pellets with the tail foremoſt, raiſing up their hinder part, and ſhoving along the ball with their hind feet. They are always accompanied by other beetles, larger, more elegant in ſtructure and colour. The breaſt covered with a crimſon ſhield, ſhining like metal; the head is crimſon mixed with green; on the crown of the head a ſhining black horn, bending backward. Theſe are named kings of the beetles, but partake of the ſame dirty drudgery.

The Elephant-beetle is the largeſt known; inhabits South America, particularly Guiana and Surinam, and the river Oroonoko; is black, covered with a very hard ſhell, full as thick and ſtrong as a ſmall crab. Its length four inches. The breadth of the body two inches and a quarter; the breadth of each *elytron* or caſe for the wings, an inch and three tenths.

The *antennæ*, or feelers, are horny, almoſt an inch long, pointed; the proboſcis is moveable at its inſertion into the head, and ſeems to ſupply the place of feelers. The proboſcis an inch and quarter long, turns upwards, terminating in two horns, each near a quarter of an inch long; but not perforated at the end like the proboſcis of other inſects. About half an inch above the head, next the body, is a prominence, or ſmall horn, which, if the reſt of the trunk were away, would cauſe this part to reſemble the horn of a rhinoceros. [There is a beetle ſo called, but then the horn or trunk has no fork at the end, though the lower horn reſembles this.] The feet are all forked at the end, but not like lobſters claws. It is impoſſible to deſcribe the brilliancy of many foreign beetles; they ſeem compoſed of all kinds of gems and precious ſtones, each vying with the others for ſplendour: their beauty is not to be diſtinctly underſtood without magnifying-glaſſes, under which the BRAZIL BEETLE is a moſt delightful object; every part of him being ſtudded with ſurpriſing elegance; is rare, and often ſold for two guineas.

To this claſs we may refer the GLOW-WORM. No two inſects can differ more than the male and female. The male is a beetle, having caſes to its wings, and flying at pleaſure; the female is entirely a creeping inſect, and waits the approaches of her companion. The body of the female has eleven joints, a ſhield breaſt-plate, oval; the head over this very ſmall; the three laſt joints of her body yellowiſh: but what diſtinguiſhes her, in this part of the world, is the ſhining light ſhe emits by night, and which is ſuppoſed to be an emanation of allurement to her companion. In ſandy countries the ditches are ſtudded on each ſide of the road by her ſhining ſparks. If kept for ſome time its light grows paler, and at laſt expires. It is probable this light is electrical.

In tropical climates this peculiarity is very greatly exceeded: the light from fire flies, lanthorn flies (whoſe light is in their head), and many others, is ſurpriſing; it is probably for the ſame purpoſe, and produced on the ſame principle, greatly exalted.

The CANTHARIS, or *Spaniſh Fly*, is of the beetle kind, has feelers like briſtles, flexible caſes to the wings, a breaſt pretty plain, and the ſides of the belly wrinkled; they differ in ſize, ſhape, and colour; the largeſt are an inch long, and as much in circumference; ſome are pure azure, others pure gold, others a mixture of pure gold and azure; all are very brilliant and beautiful. They are chiefly natives of Spain, Italy, and Portugal. They are fond of aſh-leaves, and will ſometimes ſtrip a tree bare. Some affirm, that they delight in ſweet-ſmelling herbs; they are fond of honeyſuckles, lilac, and wild-cherry ſhrubs. The country people expect their

return every ſeven years. Such numbers of theſe inſects have been ſeen together in the air, that they appeared like ſwarms of bees; they have ſo diſagreeable a ſmell, that it may be perceived a great way off, eſpecially about ſun-ſet, though they are not ſeen. When caught and dried, they are ſo light, that fifty will hardly weigh a dram. They kill them with vapours of hot vinegar, after which they dry them in the ſun, and keep them in boxes; they are penetrating, corroſive, and, applied to the ſkin, raiſe bliſters.

The KERMES is produced in the excreſcence of an oak, called the berry-bearing ilex; is at firſt wrapt in a membranaceous bladder, the ſize of a pea, ſmooth, ſhining, browniſh red, covered with very fine aſh-coloured powder. This bladder in May or June teems with a number of reddiſh eggs or inſects, which being rubbed emit a crimſon liquor. In April this inſect is the ſize and ſhape of a pea; its eggs ſoon after burſt from the womb, and becoming worms, run about the tree: ſuch are the females. The males are a ſort of flies like gnats, with ſix feet, the four forward ſhort, the two backward long, divided into four joints, and armed with three crooked nails, two feelers on the head, moveable, ſtreaked, and articulated, a quarter of an inch long; the tail very ſhort, forked. The whole body is covered by two tranſparent wings, and they leap about like fleas. The women gather them before ſun-riſing, tearing them off with their nails, for fear there ſhould be any loſs from their hatching. They ſprinkle them with vinegar, and lay them in the ſun to dry, where they acquire a red colour.

The COCHINEAL INSECT is oval, the ſize of a ſmall pea, with ſix feet, and a ſnout or trunk; brings forth its young alive; is nouriſhed by ſucking the juice of a plant. Its body conſiſts of ſeveral rings, and when once fixed on the plant, it continues immoveable, being ſubject to no change. There are two ſorts, the domeſtic and the wild; the wild feeds on uncultivated trees, but the domeſtic is carefully attended and removed to cultivated trees of the prickly pear-plant, and defended from other inſects. When the rains and cold weather are coming on, they take off the leaves or branches covered with cochineal, not yet at perfection, and keep them in their houſes. Theſe leaves are very thick and juicy, and ſupply them nouriſhment. When milder weather returns, and they are about to exclude their young, the natives make them neſts of tree-moſs, or ſoft hay, or the down of cocoa-nuts, placing twelve in every neſt. Theſe they fix on the thorns of the prickly pear-plant; in

three

three or four days they bring forth their young, which leave their nests in a few days, and creep on the branches of the plant, till the females are visited by the males, which are winged insects; they produce a new offspring yielding a new harvest thrice a year. When gathered, they put them into holes in the ground; they are killed with boiling water, and dried in the sun, or on hot plates. From the various methods of killing them arise their different colours when brought to us.

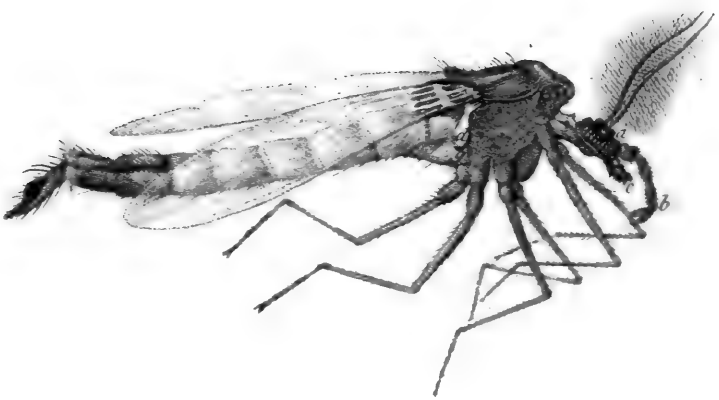
It is evident that the foregoing (like the following) are not beetles, as they do not undergo the changes, &c. which belong to that tribe; yet, on the whole, this may be as convenient a place as any for them to occupy.

Gall Insects are bred in excrescences, adhering to a kind of oak in Asia, which differ in colour, size, roughness, and shape; these we call galls. The female of this animal is furnished with an implement, by which she penetrates into the bark of the tree, or into a spot which just begins to bud, and there sheds a drop of corrosive fluid. She deposits her eggs in the place. The juice or sap fermented by the wound and fluid, turned from its natural course, flows round the egg; after which it is swelled by bubbles of air. The external coat of thick excrescence is dried by the air, and grows like a kernel, receiving nutriment slowly. The worm that is hatched under it finds in its substance, which is tender, a subsistence till the time for its transformation to a nymph, and from that changes to a fly, and rises into the air. The gall-nut that grows in autumn if surprised by the cold weather before the worm is transformed to a fly, the nut falls with the leaves, and the fly passes the winter in a shelter, where every crack and cranny is well stopped up, which preserves it from the injuries of the weather. Here it acquires its perfect state, and, roused by the first heats, breaks its way through.

THE GNAT AND THE TIPULA.

THEIR differences of form are so very minute, that it is difficult to distinguish one from the other: they have both long legs, two wings, and slender bodies; their heads large, they seem hump-backed; but the tipula wants a trunk, while the gnat has a large one. The tipula harmless and peaceful; the gnat sanguinary and predaceous.

The gnat proceeds from a little worm, at the bottom of standing waters. Its eggs, after being laid on the surface of the water, are surrounded by



The Tufted Gnat.

Magnified

by an unctuous matter, which prevents their ſinking; but they are faſtened with a thread to the bottom, to prevent their floating away. Thus the inſects, in their egg ſtate, reſemble a buoy fixed by an anchor. As they come to maturity, they ſink, and when they leave the egg as worms, they creep at the bottom. They make lodgments of cement, which they faſten to ſome ſolid body at the bottom, unleſs by accident they meet with a piece of chalk, which being of a ſoft nature, affords opportunity of ſinking a retreat for themſelves, where nothing but the claws of a crayfiſh can poſſibly moleſt them. The worm afterwards appears with a large head, a hairy tail, moiſtened with an oily liquor, which ſhe uſes as a cork, to ſuſtain her head in the air, and her tail in the water, and to tranſport her from place to place; this liquor ſhe diſcharges out of her mouth. The gnat, in her ſecond ſtate, is properly a nymph, which is an entrance to a new life. In the firſt place ſhe diveſts herſelf of her ſecond ſkin; in the next ſhe reſigns her eyes, antennæ, and tail, and ſeems to expire; but from her ſpoils riſes a little winged inſect, whoſe ſtructure is a juſt object of admiration. Its little head is adorned with a plume, and its whole body inveſted with ſcales and hair. The little border of fine feathers, which graces her wings, is very curious: her trunk may juſtly be deemed one of Nature's maſter-pieces. It is ſo very ſmall, that the extremity of it can ſcarcely be diſcerned through the beſt microſcope. That part which appears is but a long ſcaly ſheath under the throat. At near the diſtance of two thirds of it is an aperture, through which the inſect darts four ſtings; one of which is the caſe in which the other three lie concealed, and run in a long groove. Their ſides are ſharpened like two-edged ſwords; they are barbed, and have a vaſt number of cutting teeth toward the point, which turns up like a hook, and is ſurpriſingly fine. Theſe darts ſtruck into the fleſh of animals, ſometimes one after another, ſometimes all at once, extravaſate the blood and humours. When the gnat, by the point of her caſe, which ſhe uſes as a tongue, has taſted any fruit, fleſh, or juice, if it be fluid, ſhe ſucks it up, but if ſolid, ſhe pierces it, draws back her ſtings, and by their ſheath, which ſhe applies to the wound, extracts the juices. Winter ſhe paſſes in quarries or caverns, which ſhe abandons at ſummer, and flies to ſome ford, or ſtanding water, where ſhe may produce her progeny, which would be ſoon waſhed away by the too rapid motion of any running ſtream. The little brood are ſometimes ſo numerous, that the very water is tinged according to their colour.

Very extraordinary circumſtances are reported of the gnat, and indeed

barely credible. Some are oviparous; ſome viviparous; ſome males, and unite with the female; or females, requiring the male; ſome are of neither ſex, yet produce young without aſſiſtance. A gnat incloſed alone in a glaſs veſſel, with air to keep it alive, ſhall produce young, which alſo, when ſeparated from each other, ſhall be parents of a numerous progeny, the young burſting from the body of their parents without previous impregnation. At the ſixth generation this ſtops, the gnat no longer produces from itſelf alone, but requires the male to beſtow another ſucceſſion of fecundity.

In America, where the waters ſtagnate, and the climate is warm, gnats are produced in multitude of multitudes; the whole air filled with clouds of all ſizes, from ſix inches long to minuteneſs itſelf. The mid-day ſun is too powerful for them; but during evening nothing can ſhield the wretched inhabitants from their attacks; though millions are deſtroyed, millions more ſucceed, in unceaſing torrents. The native Indians, who anoint their bodies with oil, and have been uſed to their depredations, find them much leſs inconvenient than Europeans; they ſleep covered with thouſands. If a candle be lighted in theſe places, a cloud of inſects lights on the flame, and extinguiſhes it; ſo that they are obliged to keep their candles in glaſs lanthorns. Nor is it a little extraordinary that the ſame multiplication of the gnat kind ſhould occur in Lapland, where thoſe gentlemen who went to meaſure a polar degree were extreme ſufferers by heat and inſects: while thoſe engaging in meaſuring an equatorial degree were periſhed by ſtorms, ſnows, and cold.

Such are the ways of Nature, as exemplified in the tribes of inſects. We have ſeen other creatures transformed, but not ſo often; nor after equally apparent diſſolution. Among ſo numerous a tribe it is difficult to form a juſt ſelection, which may include all their various ways of obtaining life; and perhaps ſome may exiſt whoſe transformations may be yet more numerous and peculiar, their manners and properties more remarkable and wonderful: for certainly thouſands are unknown to us in countries where ſtudy and learning have not penetrated, and of which our information is extremely limited; not to mention the difficulty of accurate acquaintance with thoſe more immediately ſubject to our notice, ariſing not leſs from their modes of life, than from their unlikeneſs in different ſtates.

WORMS AND ZOOPHYTES.

THE LEECH

HAS great reputation for its phlebotomical ſervices, being eſteemed the beſt of blood-letters; and as ſuch known to the ancients. PLINY names it the *hirudo ſanguiſuga*; was uſed inſtead of cupping glaſſes for perſons of a full habit of body, or goutical. There are ſevera: ſorts, all ſtrongy allied to worms. In general the body oblong; moves by aſſuming an arch-like form; takes its food entirely by ſuction; and what is very remarkable, has no viſible ejectory to diſcharge it after digeſtion; it is therefore by moſt naturaliſts ſuppoſed to paſs through the pores of its ſkin, perhaps ſomewhat in the nature of perſpiration. They have been kept long in glaſſes without in the leaſt diſcolouring the water, or cauſing any ſediment. Kept in glaſſes they are good barometers, and predict bad weather by their reſtleſſneſs and perpetual change of place; they live long without food, thus kept. They inhabit ſtanding waters generally, and perhaps by preference, though I have caught them in ſhallow running ſtreams. When placed in the middle of ſuch a ſtream, they adhere by ſuction at the tail to whatever they find; yet often the current is too ſtrong for them. In ſome places abroad they ſwarm ſo prodigiouſly, as to deter the inhabitants from venturing into many pieces of water; for ſuch numbers would attack them, as would drain them quickly of their blood; by their ſtrong adheſion they are difficult to get rid of, and ſometimes leave dangerous wounds, of which circumſtance there are accounts.

The MEDICAL LEECH has a brown body, marked with ſix yellow lines, belly lighter. The *Horſe Leech* has a flattiſh body; in the bottom of the mouth certain great ſharp tubercles; is ſlendereſt about the mouth; thickeſt towards the tail; the tail ſlender; belly yellowiſh-green; back duſky. The ſea furniſhes a kind or two that greatly infeſt fiſh. That kind uſed medically is ſaid to faſten where a ſpot is rubbed with blood or milk, and to diſcharge what it has ſwallowed, if ſprinkled with ſalt. In moſt particulars conformable to worms, but not capable of propagation by being cut in pieces.

WORMS,

BEING deſtitute of feet, trail themſelves along on the ground, and inhabit the earth, or the water; though they creep along the earth on their bellies, yet their motions are very different from

thoſe of ſerpents. There is a ſpiral muſcle that runs round the body, from head to tail, ſomewhat reſembling a wire-ſpring to a bell which is hung from room to room; which, if one end be extended and held faſt, will bring the other nearer to it: by this the earth-worm, having extended itſelf, holds by the ſlime of the fore part of its body, then contracts itſelf and brings forward the hinder part.

Its body is armed with ſmall ſtiff ſharp burs or prickles, which it can erect or depreſs at pleaſure; under the ſkin lies a ſlimy juice, ejected as required, at certain perforations, between the rings of the muſcles, to lubricate its body, and facilitate its paſſage into the earth. It has breathing-holes along the back, adjoining each ring. Deſtitute of head, ears, noſe, for the moſt part of eyes, and properly without feet. It has a mouth, and an alimentary canal, which runs to the very point of the tail (but in ſome found in the bodies of animals, this canal opens towards the middle of the belly), filled with a very fine earth, which ſeems to be their nouriſhment.

Without brain, but near the head is the heart, which beats diſtinctly; round it are the ſpermatic veſſels, forming a number of little globules, containing a milky fluid, opening into the belly, not far from the head: they are alſo often found to contain eggs, which are laid in the earth, and hatched in twelve or fourteen days, by the warmth; like ſnails, theſe animals unite in themſelves both ſexes.

The young ones are very ſmall, but perfectly formed, and ſuffer no change: how long they live is not known, certainly more than two or three ſeaſons. During winter, they bury themſelves deep, and ſeem to ſhare the general torpidity. In ſpring they revive, a moiſt or dewy evening brings them from their retreats, for mutual intercourſe. They chiefly live in a light, rich, and fertile ſoil, moiſtened by dews or accidental ſhowers, but ſhun where the water is apt to lie, or the clay is too ſtiff. They avoid the mole, who feeds on them, by darting up from the earth, the inſtant they feel the ground move; and fiſhermen take them in numbers, by ſtirring the earth.

The Earth Worm continues to live, though cut in ſeparate parts. We owe the diſcovery of this power of reproduction in animals to Mr. Trembley, who firſt obſerved it in the polypus; after him, Spalanzani and others found it in the earth-worm, the ſea-worm, and ſeveral other animals. Every earth-worm, however, did not retain the vivacious principle equally; ſome, when cut in two, were deſtroyed; of others, while the head was living, the tail periſhed, and a new tail came at the extre-

mity. In the ſmall red-headed earth-worm, both extremities ſurvived the operation; the head produced a tail with the anus, the inteſtines, the annular muſcle, and the prickly beards; while the tail in leſs than three months ſent forth a head, heart, and inſtruments of generation. This part was produced ſlowly, a new head taking three or four months for its completion, a new tail not ſo many weeks.

The SEA-WORM, the white water-worm, and many of thoſe little worms with feelers, found at the bottom of dirty ditches, are capable of the ſame.

THE STAR-FISH, OR SEA-BLUBBER.

THIS is a numerous tribe, ſhapeleſs and deformed, aſſuming at different times different appearances; now round like a ball, ſhortly after as thin as a plate. This kind are formed of a ſemi-tranſparent gelatinous ſubſtance, covered with a thin membrane, and often appear like a lump of jelly, floating at random on the ſea, or thrown by chance on the ſhore; yet they poſſeſs life and motion, and ſhoot forth arms in every direction to ſeize on ſuch inſects as are near. Worms, fiſh ſpawn, even muſſels, with their ſhell, have been found in the ſtomachs of theſe animals, which are no way injured by ſwallowing ſuch hard ſubſtances.

In ſummer, when the water of the ſea is warmed, they float, and in the dark emit a kind of ſhining light reſembling phoſphorus. Some call them ſea-nettles, becauſe they ſting the hands of thoſe that touch them, like nettles. They are often ſeen faſtened to the rocks, and to the largeſt ſea-ſhells. If put into ſpirit of wine, they will continue many years entire; but if left to the influence of the air, they are, in leſs than four and twenty hours, melted down into limpid and offenſive water.

None poſſeſſes other vent for excrements but the ſame paſſage by which they devour their food: in general they reſemble a truncated cone, its baſe applied to the rock to which they are uſually attached. Though generally tranſparent, yet they are of different colours, ſome inclining to green, or red, or white, or brown. In ſome, the colours appear diffuſed, others are often ſtreaked, and others ſpotted. Many of them poſſeſs a number of long ſlender filaments, in which they entangle ſmall animals,

mals, and thruſt them into their enormous ſtomachs, which fill the whole cavity of their bodies. The harder ſhells continue for ſome weeks indigeſted, but at length they undergo a kind of maceration, and become a part of the ſubſtance of the animal.

They may be cut in pieces, and every part will ſurvive the operation; each becoming a perfect animal, endued with its natural rapacity.

The CUTTLE-FISH is about two feet long, covered with a very thin ſkin, its fleſh compoſed of gelatinous ſubſtance, within ſtrengthened by a ſtrong bone. It has eight arms, capable of lengthening or contracting at pleaſure; when dead, they become rigid. They feed on ſmall fiſh, which they ſeize with their arms; they are bred from eggs, which are laid upon the weeds along the ſea-ſhore.

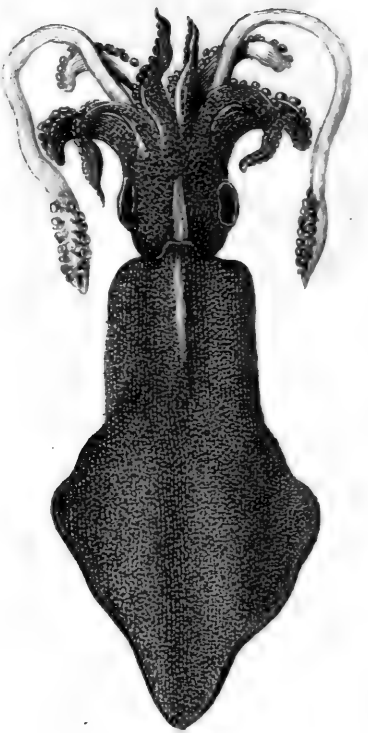
The cuttle-fiſh is found on many coaſts of Europe, but not eaſily caught, being furniſhed by Nature with a black ſubſtance contained in a bladder generally on the left ſide of the belly, and which is ejected in the manner of an excrement. Whenever this fiſh is purſued, and it finds a difficulty of eſcaping, it ſpurts forth a great quantity of this inky liquor, by which the water is darkened, and it eſcapes, by lying cloſe at the bottom.

THE POLYPUS.

THE moderns have given the name POLYPUS to a little freſh-water creature, found at the bottom of wet ditches, or attached to the under ſurface of the broad-leafed plants that grow on the waters. Sea-Polypi, which were well known to the ancients, are from two feet long to three or four; and Pliny has deſcribed one, whoſe arms were thirty feet long. Our ditch-water Polypi ſeldom exceed three parts of an inch long, and when gathered up, not a third of thoſe dimenſions, but in form they reſemble the larger.

To Mr. Trembley we owe the diſcovery of the amazing properties and powers of this little vivacious creature: he divided this claſs of animals into four different kinds, according to their colours, green, brownish, fleſh colour, and tufted.

They appear in a wet ditch like little tranſparent lumps of jelly, the ſize of a pea, flatted on one ſide; the under ſide of broad-leafed weeds



The Cuttle-fish.

on the ſurface of the water, is often ſtudded with a number of theſe little jelly-like ſubſtances, which are polypi gathered up into a quieſcent ſtate. In action they aſſume a very different appearance; the finger of a glove, cut off at bottom, with ſeveral threads round the edge like a fringe, will give us an idea of the ſtomach of the animal, and its arms or feelers. It has neither muſcles nor rings: its manner of lengthening or contracting itſelf moſt reſembles that of the ſnail; it contracts itſelf in proportion as it is touched, or as the water is agitated. Warmth animates, and cold benumbs them; but a degree of cold approaching congelation only reduces them to perfect inactivity: their arms are double (often thrice) as long as their bodies; theſe are thrown about in various directions to ſeize its prey; ſometimes three or four are employed, while the reſt are contracted, like the horns of a ſnail, within the animal's body. It ſeems capable of giving what length it pleaſes to theſe arms, and ſtretches them in proportion to the remoteneſs of the object it would ſeize.

They go from one part of the bottom to another; they mount along the margin of the water, and climb the ſides of aquatic plants. They often come to the ſurface of the water, where they ſuſpend themſelves by their lower end. They advance very ſlowly, employ a deal of time in every action, and bind themſelves very ſtrongly to whatever body they meet as they proceed; their adheſion is voluntary, and probably performed in the manner of a cupping-glaſs.

They have a remarkable attachment to turn towards light, yet no eyes have ever been diſcovered by the beſt microſcopes.

In the center of the arms the mouth is placed, ſerving at once as a paſſage for food, and an opening for it after digeſtion. The inward part of the animal ſeems to be one great ſtomach, open at both ends; but the purpoſes of the opening at bottom are unknown, unleſs it be of adheſion. The ſurface of the body of this little creature, examined with a microſcope, appears ſtudded with a number of warts, as alſo the arms, eſpecially when contracted.

They chiefly ſubſiſt on inſects leſs than themſelves, particularly a kind of water-millepedes, and a very ſmall red worm, which they ſeize with great avidity. Wherever its prey is, which the animal finds by feeling, a touch faſtens the object it would ſeize beyond eſcape. The greater its diſtance, with the greater eaſe the Polypus brings the prey to its mouth. If the little object be near, though irretrievably caught, it is not without great difficulty it can be brought to the mouth and ſwallowed.

When the Polypus is unſupplied with prey, it teſtifies its hunger by opening its mouth: the aperture, however, is ſo ſmall that it cannot be eaſily perceived; but when, with any of its long arms, it has ſeized its prey, it then opens the mouth diſtinctly enough, and always in proportion to the ſize of the animal it would ſwallow; the lips dilate inſenſibly, and preciſely to the figure of their prey. Mr. Trembley found they could devour aliments of every kind, fiſh and fleſh as well as inſects. When he gave one of theſe famiſhed reptiles any ſubſtance which was improper for aliment, at firſt it ſeized the prey with avidity, but, after keeping it ſome time entangled near the mouth, let it drop again with diſtinguiſhing nicety.

When ſeveral polypi happen to ſeize the ſame worm, they diſpute their prey. Two are often ſeen ſeizing the ſame worm at different ends, and dragging it at oppoſite directions with great force. Often they continue ſwallowing each his part, till their mouths meet; then they reſt till the worm breaks; but it often happens, when the mouths of both are thus joined, the larger polypus gapes and ſwallows his antagoniſt, which, after it has lain in the conqueror's body an hour, iſſues unhurt, and often in poſſeſſion of the prey contended for.

They continue eating the whole year, but when the cold approaches to congelation, then they feel the general torpor, and their faculties are for two or three months ſuſpended. The meal of one day ſuffices them ſeveral months. In general they devour in proportion to their ſize, and their growth is quickeſt as they are beſt fed.

They are produced in as great a variety of manners as a vegetable. Some polypi from eggs, as plants from ſeed; ſome by buds, as plants by inoculation; all may be multiplied by cuttings, and this to minuteneſs beyond expectation.

In ſummer, a polypus exhibits in different parts of its body tubercles or little knobs, which enlarge daily, and, after two or three days, take the figure of a ſmall animal, reſembling its parent, furniſhed with feelers, a mouth, and apparatus for ſeizing and digeſting its prey: this daily becomes larger, like the parent, to which it continues attached; ſpreads its arms to ſeize whatever is proper for aliment, and devours it for its own particular benefit; thus it poſſeſſes two ſources of nouriſhment, that which it receives from the parent by the tail, and that which it receives from its own induſtry by the mouth. The food which theſe animals receive often tinctures the whole body, and the parent is ſeen communicating

ing part of its fluids to its progeny that grows on it. Several young ones are thus ſeen at once, of different ſizes, growing from its body; ſome juſt budding, others acquiring their form, and others come to maturity, juſt ready to drop from their original ſtem. Young ones, while attached to their parent, propagate their own young ones alſo, each in the ſame dependence on its reſpective parents, and poſſeſſed of the ſame advantages as have been deſcribed.

It is indifferent whether one of them be cut into ten, or ten hundred parts, each becomes a perfect animal; but the ſmaller part thus ſeparated will be longeſt in coming to maturity. The animal has been twiſted and turned into all manner of ſhapes; has been turned inſide out, and cut in every diviſion, yet ſtill it continued to move, its parts adapted themſelves again to each other, and in a ſhort time it became as voracious and induſtrious as before.

Beſides theſe kinds mentioned by Mr. Trembley, there are others which have been ſince diſcovered by the vigilance of ſucceeding obſervers; ſome of theſe ſo ſtrongly reſemble a flowering vegetable in form, that they have been miſtaken by many naturaliſts. Mr. Hughes, in his Natural Hiſtory of Barbadoes, has deſcribed a ſpecies of this animal, but called it *a ſenſitive flowering plant*; he obſerved it to take refuge in the holes of rocks, and, when undiſturbed, to ſpread forth a number of ramifications, each terminated by a flowery petal which ſhrunk at the approach of the hand, and withdrew into its hole. This *plant* however was a polypus, not only found in Barbadoes, but on the coaſt of Cornwall, and the ſhores of the Continent.

LITHOPHYTES AND SPONGES.

THE animals we ſee, much leſs thoſe we are acquainted with, bear no proportion to thoſe concealed from us. Though every leaf and vegetable in the air ſwarms with animals, yet in the water they are ſtill more abundant, and at ſea abſolutely innumerable: the greateſt part of what ſeem vegetables growing in the deep, are but the artificial formation of inſects, and built for their own habitation.

The bottom of the ſea along ſome ſhores, and at the mouths of ſeve-

ral rivers, has the appearance of a foreſt under water, millions of plants growing with their branches entangled in each other, ſometimes ſo ſtrongly as to obſtruct navigation. The Perſian gulph, the Red ſea, the Weſtern coaſts of America, are choaked up in many places with coraline ſubſtances; though ſhips force a paſſage through them, they are impracticable to boats and to ſwimmers.

Corals ſometimes ſhoot out like branches of trees, or a broad ſurface like a fan, or a large bundling head like a faggot; ſometimes they reſemble a plant with leaves and flowers; often the antlers of a ſtag. Elſewhere in the ſea are ſeen ſponges of various magnitude, and extraordinary appearances, aſſuming phantaſtic forms like muſhrooms, mitres, fonts, flower-pots. Theſe productions ſeem entirely vegetable; but the ingenious Mr. Ellis, by ſagacious and diligent enquiry, determined that corals and ſponges are the work of animals, and (like the honeycomb) coral was produced by an infinite number of aſſociates; theſe are of the polypus kind, whoſe united labours fill tracts of ocean with theſe tokens of their induſtry.

Should we be induced to break off a branch of the coraline ſubſtance from its original connection, we ſhall perceive its whole ſurface, which is very rugged and irregular, covered with a mucous fluid, almoſt in every part ſtudded with little jelly-like drops: theſe cloſely examined prove to be of the polypus kind; have motions, arms, and appetites exactly reſembling thoſe already deſcribed, but they ſoon expire when taken out of the ſea.

A coraline plant, ſtrictly obſerved while growing, if not diſturbed, the little polypi will be ſeen in infinite numbers, each iſſuing from its cell, and in ſome kinds the head covered with a little ſhell, reſembling an umbrella, the arms ſpread abroad to ſeize its prey, while the hinder part remains attached to its habitation, from whence it never wholly removes. All are aſſiduouſly employed in the ſame purſuits.

Mr. Ellis examined their operations juſt as they were beginning. In a neglected oyſter-bed he perceived the firſt rudiments of a coraline plantation, and tufts of various kinds ſhooting from different parts. He took out the oyſters thus furniſhed with coralines, and placed them in a large wooden veſſel, covering them with ſea-water. In about an hour he perceived the animals, which before had been contracted by handling, and had ſhewn no ſigns of life, expanding themſelves in every direction, and employed in their own natural manner. To preſerve them thus expanded, ſo as to be permanent objects of curioſity, he poured, by ſlow

degrees, an equal quantity of boiling water into the veſſel of ſea-water. He then ſeparated each polypus with pincers from its ſhell, and plunged each ſeparately into ſmall cryſtal vaſes, filled with ſpirit of wine mixed with water. By this means the animal was preſerved entire, without having had time to contract itſelf; and thus he perceived a variety of kinds, almoſt equal to that variety of productions which theſe little animals form. He perceived and deſcribed fifty kinds, each poſſeſſing its peculiar mode of conſtruction, and forming a coraline none of the reſt can imitate. On every coraline ſubſtance are a number of polypi, not reſembling the erectors of the building, but a vagabond race.

In general the ſame difference that ſubſiſts between the honey-comb of the bee, and the paper-like cells of the waſp, ſubſiſts between the different habitations of coral-making polypi. They have been named by their likeneſs to ſome well-known object, ſuch as coralines, fungi, madrepores, ſponges, aſtroites, and keratophytes. Though theſe differ extremely in their outward appearances, they all are formed in the ſame manner by polypi of various kinds and nature. When examined chemically, corals diſſolve in acids, and ſponges burn with an odour ſtrongly reſembling that of burnt horn.

Probably the ſubſtance of coral is produced, like the ſhell of a ſnail, from a ſlimy matter, which covers its body, and hardening, becomes an habitation; ſeveral of theſe united, form at length a conſiderable maſs.

Minute and diminutive as ſome of thoſe creatures ſeem to whoſe manners we have paid attention, they are large when compared to others, of whom we have information, but whoſe natures are greatly concealed by their ſmallneſs. Among the moſt remarkable of theſe are,

EELS IN PASTE.

FLOUR and water boiled together till moderately conſiſtent, and expoſed to the air in an open veſſel, after ſome days (if not mouldy) will turn ſour, and exhibit multitudes of long, ſlender, wriggling animalcula, not always inviſible to the naked eye. They may be kept a year, by ſupplying a drop of vinegar, or water, occaſionally; theſe are viviparous, and many young are found in the body of the parent, each coiled up and included in its proper membrane, to the number of an hundred.

How far the former are related to *eels in blighted wheat* is dubious: theſe

theſe are lodged in grains that appear blackiſh, as if ſcorched, and when opened contain a ſoft white ſubſtance, like a number of threads lying beſide each other, which, if wetted while freſh, ſeparate, and diſcover themſelves to be living creatures. At firſt their motions are languid, but gradually they become invigorated, yet always move ſomewhat ſlowly, and with regularity; bending their extremities ſometimes differently, ſometimes alike. If the grains of wheat are dry, and opened while dry, and the thread-like matter be put into the water, often the whole miſcarry; but if they be previouſly ſteeped in water, or buried in the earth, ſo that they moiſten gradually, then, after being opened, and the water admitted to their contents, in the courſe of a few hours they revive, and become lively. This has been aſcertained after the grains had been dry for four or more years. If the huſks be left in much water, the eels quickly die; but if removed they live ſeveral months, and ſhould the water dry away, are revived by a freſh ſupply; if left in the huſks they periſh, having no powers yet known whereby to open their priſons. There are ſome differences between theſe eels and thoſe of paſte; what is their real relation we know not.

Pepper-water yields a great variety of minute inſects, even though the pepper has been preſerved many years. Common black pepper groſsly pounded, put into an open veſſel, and water poured on it, and the mixture well ſhaken, will in a few days be covered by a pellicle reflecting the priſmatic colours: this contains millions of creatures at firſt very ſmall, but increaſing daily in ſize and numbers, till the whole fluid ſeems alive. Their kinds are very various; ſome are ſwift and agile, ſeeming in continual chaſe of prey, can creep as well as ſwim, are fringed all round their bodies; others have globular bodies and long tails; others reſemble flounders; others worms; of ſome an hundred placed in a row would not equal in diameter a grain of ſand.

Nor is this effect peculiar to pepper: hay, ſtraw, oats, barley, or any other vegetable, infuſed in like manner, will furniſh a ſcum, which, on examination, proves to be, or to contain, living creatures in prodigious numbers; ſome of the ſame ſort as thoſe in pepper-water; others totally different, and peculiar to the plant infuſed; ſome reſembling ſerpents in form and motions, coiling themſelves round in like manner. Eel-like animals are frequent among them.

Vinegar alſo abounds with eel-like creatures, after having ſtood a few days uncovered, in the ſummer ſeaſon. Of theſe it is remarkable, that if the vinegar be but moderately heated by the fire, they die and fall

to

to the bottom; but cold does not hurt them. If frozen and thawed repeatedly, they repeatedly revive and become briſk; if a quantity of oil be poured on the vinegar, they creep up into the oil when the vinegar begins to freeze, and return to the vinegar when that is thawed. By a few grains of ſand put among them they are greatly embarraſſed, and are in a manner overwhelmed by ſuch huge ſtones.

Rain Water, after ſtanding a few days, exhibits ſimilar appearances; water in ditches and water that drains from dunghills is often ſo crowded with animals, as to ſeem all alive, eſpecially the deep brown water from dunghills. It is probable that ſome of theſe animalcula are extremely minute flies in their worm ſtate, and undergo one transformation, if not more, ere they become perfect; others are unqueſtionably in their perfect ſtate, here breed, live, and die, without change. The infinite variety of their forms, motions, parts, and contrivances for catching prey, is unlimited. Some of them are congregated in millions of millions to an inch ſquare, under the appearance of mud, or weeds, or ſlime in ditches: of all colours, eſpecially blackiſh-green. Some are like worms, having membranous coverings; other ſhelled like muſſels, or cockles: ſome ſeem capable of varying their forms, ſeeming now rounded, now lengthened, now with a long neck, now with quite a different conformation; many of them reſemble ſuch inſects as are familiar to us, and are like them cruſtaceous, have feelers, legs, tails, &c. Uſually the microſcope ſhews that their internal conformation is not altogether unlike, and we conceive of them as having the ſame parts in a general idea, but inexpreſſibly ſmaller. Crabs and lobſters in form, and perhaps in manners (ſo far at leaſt as having ſpawn under the tail, or in receptacles on each ſide of it), are common among them; and it is not impoſſible they alſo change their ſkins.

In general theſe minute inſects may be referred to, (1.) Thoſe which infeſt other animals, for there is no animal we know but has its plague of this kind, as well fiſh as beaſts and birds. (2.) Thoſe infeſting vegetables, which are as numerous and different as vegetables themſelves. (3.) Thoſe found in freſh waters, rivers, drains, cuts, ditches, and ſtanding waters; not a place without ſome kind, which there inhabits and breeds; often many various kinds, whoſe forms beſpeak utter diſſimilarity. (4.) Thoſe of the ſea, whoſe multitudes are too various to admit our knowledge.

It requires no inconſiderable ſtrength of thought and reflection, no inconſiderable mental exertion, to form any idea of this multiplied claſs of beings: if we advert to thoſe produced in waters around us, of which,

though ſome kinds ſeem to be nearly general, yet we find in almoſt every piece of water ſome peculiar to itſelf; if we eſtimate the number of ſuch pieces of water, and the kinds appropriate to them in our own country, in Europe, on the globe; if we remark, that in warm climates Nature ſeems to ſport in donation of life, that the tropics prompt and haſten generation after generation (therefore we muſt advance on the conception we may have formed of our own fertility), as well in kinds as in ſucceſſion—when we have ſo done, we ſhall fall infinitely below the truth; no eſtimate we can poſſibly form will in any proportion approach the real fact. There exiſt creatures infinitely more abundant than we imagine, of kinds infinitely more diverſified than we imagine, of dimenſions infinitely ſmaller than we imagine, much as are vaunted the excurſive powers of human imagination—what then ſhall we ſay to thoſe whoſe habitation is the mighty deep; who are ſhrouded from our inſpection amid the obſcurity of the profound abyſs? Their exiſtence we cannot doubt, ſince we occaſionally diſcover ſome of their fellows, and are not ignorant of others that inhabit the verges of the receptacle of waters.

What know we of the works of Almighty Power? Infinitely the majority is hid from us; very limited is our knowledge of what we ſeem to know; their groſſer properties only, or merely their exiſtences, are diſcerned by our natural ſenſes, and little more by all the aſſiſtance of art and reaſon. Indeed our ſenſes are extremely confined; but we glory that our rational powers have greatly augmented their abilities, have directed and aſſiſted their reſearches, have demonſtrated, that what ſeems utterly incredible may be fact, that what ſeems contrary to appearances may be juſt, that ſeemingly well grounded principles muſt often be admitted with heſitation, or be qualified by numerous exceptions, and that thoſe who know moſt are but beſt inſtructed how much remains unknown.

We have ſurveyed animals whoſe bulk is enormous, whoſe ſtrength is prodigious, whoſe voracity is tremendous: ſhall we contraſt them to thoſe whoſe ſmallneſs eſcapes our ſight? How utterly diſſimilar their dimenſions, and their powers! At that we tremble, at this we ſmile; to aſſault one we conjoin hoſtile forces—number and union overcomes might; on the others we trample without regard, and cruſh myriad after myriad without reflection: thoſe require vaſt ſpaces to afford maintenance; theſe are crowded into one maſs: thoſe reign tyrants of the deep or the foreſt; theſe ſeek ſhelter in the moſt minute crevices. Yet, if we compare ſuch diſtant ranks, we find, that while the enormous cachalot ſupports itſelf by devouring thouſands of its prey, ſo do theſe minute animacula, ever active, ever

vigilant, to ſupply the cravings of appetite. The lion is not more terrific in the foreſt than theſe in the pool; nor better provided with arms for aſſault, or ſtrength for conqueſt. What then ſhall we ſay to the ſtill inferior creatures, their prey? If to ſome a grain of ſand be a rock capable of holding thouſands; if a hair be a tube capable of incloſing thouſands—what are ſuch as tremble at their aſpect, ſhrink from their terrors, dread their approach, and fly from their devaſtations? Atoms of life! for what are you deſigned? what end do you anſwer in the rank of exiſtence? Without you were the chain of being imperfect? would there be a void, a chaſm, were you extinct? Could no power replace you but what at firſt created you? Muſt the ſame almighty ſkill, the ſame omniſcient forecaſt, the ſame profound contrivance, appointment, and determination, be exerciſed toward you as toward the higher ranks of creatures? Where then is great or ſmall? where high or low? where important or ſubordinate? Were you placed as mazes to perplex mankind, as labyrinths to embarraſs human thought? Yet much as you and your fellows ſurpaſs our comprehenſion, we ourſelves ſurpaſs it more; and when you, with all that ſurrounds you, the globe you inhabit, every tribe which now occupies it, which creeps or ſwims, or runs or flies, when every relation which unites you, every bond that binds you, when all, all ſhall terminate and be concluded, we ſhall be but beginning our inceſſant occupation of aſcribing honour to Him, who was, and is, and is to come.

PRINCIPLES OF VEGETATION.

THE lower we deſcend on the ſcale of life the greater is our embarraſſment, ariſing from numbers and varieties of ſpecies. If we found it neceſſary to content ourſelves with general ideas, and a mere ſelection of fiſh and of inſects, ſtill greater difficulties prevent our intimate knowledge of vegetables; whoſe innumerable kinds, though long the ſtudy of naturaliſts, are daily proving that many remain hitherto unknown and unnoticed. Nor is this ſurpriſing, when we recollect the different ſituations, ſoils, and expoſures which they prefer; the different levels at which they grow, on plains or on mountains, on hills or on alps. Abundant throughout the globe, and every ſpot producing ſome peculiar to itſelf, unleſs the whole globe were explored ſpot by ſpot (a hopeleſs ſuggeſtion!) how could all be known? Adapted to extremes of heat and cold, of humidity and dryneſs, adapted to every climate, to every region, their ſtores are inexhauſtible: and however human induſtry may have penetrated with aſſiduous toil, not only among inhabited countries, but inhoſpitable wilds, yet, after all endeavours, many kinds will elude reſearch, though perhaps native at no great diſtance, or perhaps their ſeaſon lately paſt, or ſoon to come; if not actually preſent, but hidden in caverns or in clefts of the earth.

Declining therefore to enter deeply into a ſubject which in other hands has furniſhed many a bulky folio, and whoſe nomenclature alone, when arranged and abridged with the moſt perſevering ſkill, forms ſolid volumes, we ſhall ſelect thoſe leading principles, which being common to all, may be brought to the teſt of daily experience: for that learning ſeems moſt advantageous, whoſe uſefulneſs or application is perpetually recurring; that which is moſt ſimple, which is ever at hand, and ever delightful, is worthy our attention, and ſtrongly claims our acquaintance. Without depreciating what may poſſeſs occaſional uſefulneſs or pleaſure, what may delight or profit on emergency, we ſhall prefer what may be our conſtant companion and our attendant friend.

If pleaſure be requeſted by mankind, we have already aſſerted, the pureſt pleaſure is furniſhed by the tribes of vegetables, and human talents ſeem peculiarly adapted to their culture and enjoyment. If profit be requeſted, theſe are an unfailing ſource of profit; they ſuſtain life, by furniſhing food in various forms and of various qualities; they reſtore

ſtore health and counteract the progreſs of diſeaſe, if violent, by their activity and briſkneſs; if latent, by gentle yet powerful operations: they regale the ſenſes by their beauty and colours, by their odour and fragrance, by their reliſh and poignancy: they raiſe the mind to cheerfulneſs by their combination in the flowery parterre; they diſpoſe it to ſolemnity by the deep umbrage of the majeſtic grove. Who feels not his ſpirits exhilarated when the bending corn waves in golden ridges, courting the ſickle; when the luxuriant vine, wedded to its ſturdy elm, hangs in purple feſtoons from bough to bough? The glories of harveſt are the true glories of man; the joy of in-gathering his real joy; the ſcythe of the mower, not of war, is his trophy; and the blood of the grape, not of fellow men, his delight. O were men but ſenſible of real excellence and truly honourable diſtinction, they would ſeek it, not on the enſanguined, but the cultivated plain; not in ſpreading deſtruction, but in diffuſing life through various ranks; they "would beat their ſwords into plough-ſhares, and their ſpears into pruning-hooks," to regulate the luxuriant earth which compoſes, ſupports, and awaits them.

When formerly conſidering vegetables according to their ſtation on the ſcale of life, we thought ourſelves juſtified in aſſerting, that "where there is growth there is life; that whatever ſubject increaſes or advances toward maturity, its progreſs is the conſequence of a vital principle." Referring to that diſcourſe for ſeveral ſuggeſtions which need not be repeated, we ſhall enlarge on the principal idea of the paſſage ſelected, by adverting to the generation, growth, ſtructure, and nutrition of vegetables.

We poſſeſs ſome advantages for obtaining a general idea of the generation of vegetables, from having obſerved the various modes adapted to this purpoſe among animals; and if, in addition to this, we keep in view our principle, that life is moſt liberally beſtowed as we deſcend, we may perhaps juſtly expect moſt of the animal modes of tranſmitting life ſhould be found among vegetables, including the idea that ſome ſhould be proper to themſelves. We have ſeen animals prolong their ſpecies by the intercourſe of ſexes: this is a very prevailing manner; and in the inſtances of ſuch as are oviparous, ſeems greatly coincident with the manners of many vegetables. To this effect we find parts appropriate in general, and theſe parts furniſh a ſtriking method (uſually) of claſſing plants; though, from the ſmallneſs of ſome, and the intricate ſituations of others, they are not conſtantly obvious. Hence we have plants yielding on one tree flowers of both ſexes, and in one flower parts of both ſexes; of others, each plant is but one ſex; and others have no flowers. That the

the intercourſe of the former ſhould be moſt frequent and certain ſeems natural; but the diſtances which often intervene between plants of the latter kind is conſiderable, and indeed furniſhes no trifling objection to the ſuppoſition of their intercourſe. As we have ſeen ſome animals ſelf-impregnated, uniting in one individual the parts neceſſary to this effect, what ſhould prevent the ſame in plants? Again, if what is related of the deſcent of impregnation in the inſtance of the gnat be true, why may not this principle alſo obtain among vegetables? So that if a plant be this year impregnated, it ſhall not need a repetition of this circumſtance the next ſeaſon (or next generation): and ſince there may be various other departures from what is, notwithſtanding, a general rule; and ſince indeed among the moſt general rules Nature often ſurpriſes us with very extraordinary exceptions, I ſee no reaſon to deny either the affirmed ſexual ſyſtem of plants, or the force or fact of thoſe inſtances which, in the opinion of many, militate againſt it.

Vegetables are capable no doubt of propagation by ſlips and cuttings, and I ſhould ſuppoſe far beyond what is related of any animal whatever; wonderful as are the facts admitted of the polypus: but whether there be any vegetable capable of propagation only by this method is not that I know of affirmed; or whether there be any vegetable entirely precluded from this method: for not only plants may, by trailing, be made to ſhoot from the knots, &c. in their ſtems, but branches of trees, if judiciouſly managed, will become complete trees, not inferior in magnitude to their parents; nor are leſs remarkable the ſubdiviſions of vitality in the fruit of a potato, every *eye* of which is capable of producing a perfect plant. There is however one remarkable ſingularity attending vegetables, in that, as the branches are capable of thus becoming roots, ſo the roots are capable of becoming branches. Should we incline to change the ſituation of theſe parts of a tree, the undertaking is feaſible, and has actually been accompliſhed in ſmaller ſubjects, by ſurrounding the branches with earth in a garden-pot; and, when they have drawn nutriment from the earth, gradually withdrawing the root from its bed, and accuſtoming it to depend for ſupply on its former branches; then judiciouſly chooſing the time for its expoſure to the air, and its production of leaves.

Grafting is a kind of planting a branch from one tree in the body of another; to this it unites, and with this it lives and proſpers, or withers and decays: but it does not here unite by ſhooting out roots as it would were it in the earth, for its nutritive juices are not to ſeek; the tree ſupplies them, partly digeſted too, and fit for immediate uſe. This is clearly the

the caſe where trees of a ſimilar nature are united, and in thoſe where curioſity has combined diſſimilar natures, it has been partly the caſe; the nutriment has been in a degree forwarded toward fitneſs, and the graft has completed its deficiency. That juices thus twice *ſtrained*, as it were, firſt by the roots of the tree, then by the pores of the graft, ſhould gain or loſe ſomewhat alterative to the flavour of the fruit yielded by the graft, is not wonderful; that it ſhould be enriched or mellowed, ſhould be acidulated or ſoftened, ſeems natural, and to depend on the qualities of the tree from which it now derives its nouriſhment.

But as the general propagation of vegetables is rather by ſeeds than by any other mode, to them we ſhall now turn our attention.

SEEDS of plants are of various figures and ſizes. Moſt are divided into two lobes; though ſome, as thoſe of the creſs-kind, have ſix; and others, as the grains of corn, are entire.

But as the eſſential properties of all ſeeds are the ſame, when conſidered with regard to the principles of vegetation, our deſcription ſhall be limited to one, the great garden-bean; becauſe, after it begins to vegetate, its parts are more conſpicuous than many others, and conſequently better calculated for inveſtigation.

This ſeed is covered with two coats or membranes; the outer extremely thin and full of pores, but may be eaſily ſeparated from the inner one (which is much thicker), after the bean has been boiled, or lain a few days in the ſoil. At the thick end of the bean is a ſmall hole viſible to the naked eye, immediately over the radicle or future root, that it may have a free paſſage into the ſoil. When theſe coats are taken off, the body of the ſeed appears, which is divided into two ſmooth portions or lobes. The ſmoothneſs of the lobes is owing to a thin film or cuticle with which they are covered.

At the baſis of the bean is placed the radicle or future root, whoſe trunk, juſt as it enters into the body of the ſeed, divides into two capital branches, one to each lobe, and ſends off ſmaller ones in all directions through the whole ſubſtance of the lobes: theſe become ſo extremely minute toward the edges of the lobes, that they require the fineſt glaſſes to render them viſible. To this Grew and Malpighius have given the name of *ſeminal root*; becauſe, by means of it, the radicle and plume, before they are expanded, derive their principal nouriſhment.

The plume, bud, or germ, is encloſed in two ſmall correſponding cavities in each lobe. Its colour and conſiſtence is much the ſame with thoſe of the radicle, of which it is only a continuation; but having a quite

contrary direction: for the radicle deſcends into the earth, and divides into a great number of ſmaller branches or filaments; but the plume aſcends into the open air, and unfolds itſelf into ſtem, branches, leaves, flowers, fruit, *&c.* The plume in corn ſhoots from the ſmaller end of the grain.

The ſubſtance, or parenchymatous part of the lobes is not a mere concreted juice, but is curiouſly organized, and conſiſts of a vaſt number of ſmall bladders reſembling thoſe in the pith of trees.

When the ſeed is ſown, the moiſture is firſt abſorbed by the outer coats, which are every where furniſhed with ſap and air-veſſels; from theſe it is conveyed to the cuticle; from the cuticle it proceeds to the pulpy part of the lobes, where it is taken up by the mouths of the ſmall branches of the ſeminal root, and paſſes from one branch to another into the main trunk, which communicates both with the plume and radicle: then this vegetable food runs in two oppoſite directions; part aſcending into the plume, promotes its growth and expanſion; part deſcending into the radicle, nouriſhes the root and its filaments. Thus a plant is really poſſeſſed of two roots, both contained in the ſeed. The plume and radicle, when the ſeed is firſt depoſited in the earth, derive their nouriſhment from the ſeminal root; afterwards, when the radicle begins to ſhoot out its filaments, and to abſorb ſome moiſture, not, however, in a ſufficient quantity to ſupply the exigencies of the plume, the two lobes, or main body of the ſeed, riſe with the plume, aſſume the appearance of two leaves, reſembling the lobes of the ſeed in ſize and ſhape, but having no reſemblance to thoſe of the plume, for which reaſon they have got the name of *diſſimilar leaves*.

Theſe diſſimilar leaves defend the young plume from the injuries of the weather, and at the ſame time, by abſorbing dew, air, &c. aſſiſt the tender radicle in nouriſhing the plume, with which they have ſtill a connection by means of the ſeminal root. But, when the radicle or ſecond root has deſcended deep enough into the earth, and has acquired a ſufficient number of filaments or branches for abſorbing as much aliment as is proper for the growth of the plume, then the ſeminal or diſſimilar leaves, their utility being entirely ſuperſeded, begin to decay and fall off.

Thus we ſee, that as the egg contained not merely the fœtus of an animal, but a portion of nouriſhment ſuitable to its powers, whereby it was ſuſtained, and capable of ſupporting life a conſiderable time; ſo the ſeed contains a portion of matter fitted to nouriſh the naſcent root, capable of becoming part of it, and of ſupporting it till its own powers were competent to

that purpoſe. From this period the plant is to expect a ſupply from the root, and to derive nouriſhment by means of its extenſive ramifications, and their abſorbent properties.

We proceed now to notice the ſtructure of plants: and firſt of the root.

In examining the Root of plants, the firſt thing that preſents itſelf is the ſkin, which is of various colours in different plants. Every root, after it has arrived at a certain age, has a double ſkin. The firſt is coeval with the other parts, and exiſts in the ſeed; afterwards a ring ſent off from the bark forms a ſecond ſkin; *e. g.* in the root of the dandelion, towards the latter end of May, the original or outer ſkin appears ſhrivelled, and is eaſily ſeparated from the new one, which is freſher, and adheres more firmly to the bark. Perennial plants are ſupplied with a new ſkin every year; the outer one falls off in the autumn or winter, and a new one is formed from the bark in the ſucceeding ſpring. The ſkin has numerous cells or veſſels, and is a continuation of the parenchymatous part of the radicle. However, it does not conſiſt ſolely of parenchyma, for the microſcope ſhews that there are many tubular ligneous veſſels interſperſed through it.

When the ſkin is removed, the true cortical ſubſtance or bark appears, which is alſo a continuation of the parenchymatous part of the radicle, but greatly augmented. The bark is of very different ſizes. In moſt trees it is exceedingly thin in proportion to the wood and pith. On the other hand, in carrots, it is almoſt one half of the ſemidiameter of the root; and in dandelion it is nearly twice as thick as the woody part.

The Bark is compoſed of two ſubſtances, the parenchyma, or pulp, which is the principal part, and a few woody fibres. The parenchyma is exceedingly porous, and has great reſemblance to a ſponge; for it ſhrivels conſiderably when dried, and dilates to its former dimenſions when infuſed in water. Theſe pores or veſſels are not pervious ſo as to communicate with each other, but conſiſt of diſtinct little cells or bladders, ſcarcely viſible without the aſſiſtance of the microſcope. In all roots, theſe cells are conſtantly filled with a thin watery liquor. They are generally of a ſpherical figure, though in ſome roots, as the bugloſs and dandelion, they are oblong. In many roots, as the horſe-radiſh, peony, aſparagus, potato, &c. the parenchyma is of one uniform ſtructure; but in others it is more diverſified, and puts on the ſhape of rays running from the centre towards the circumference of the bark. Theſe rays ſometimes run quite through the bark, as in lovage; and ſometimes advance toward the middle of it, as in melilot and moſt of the leguminous

and umbelliferous plants. Theſe rays generally ſtand at an equal diſtance from each other in the ſame plant; but the diſtance varies greatly in different plants. Neither are they of equal ſizes: in carrot they are exceedingly ſmall and ſcarcely diſcernible; in melilot and cherval they are thicker. They are likewiſe more numerous in ſome plants than in others. Sometimes they are of the ſame thickneſs from one edge of the bark to the other; and ſome grow wider as they approach toward the ſkin. The veſſels with which theſe rays are amply furniſhed are ſuppoſed to be air-veſſels, becauſe they are always found to be dry, and not ſo tranſparent as the veſſels which evidently contain the ſap.

In all roots there are ligneous veſſels diſperſed in different proportions through the parenchyma of the bark. Theſe run longitudinally through the bark in the form of ſmall threads, tubular, as is evident from the riſing of the ſap in them when a root is cut tranſverſely. Theſe ligneous ſap-veſſels do not run in direct lines through the bark, but, at ſmall diſtances, incline towards one another in ſuch a manner, that they appear to the naked eye to be inoſculated; but the microſcope diſcovers them to be only contiguous, and braced together by the parenchyma. Theſe braces are very various both in ſize and number in different roots; but in all plants they are moſt numerous toward the inner edge of the bark. Neither are theſe veſſels ſingle tubes, but, like the nerves in animals, are bundles of twenty or thirty ſmall contiguous cylindrical tubes, which uniformly run from the extremity of the root, without ſending off any branches, or ſuffering any change in their ſize or ſhape.

In ſome roots, as parſnips, eſpecially in the ring next the inner extremity of the bark, theſe veſſels contain a kind of lymph, which is ſweeter than the ſap contained in the bladders of the parenchyma. From this circumſtance they have got the name of *lymph-ducts*.

Theſe lymph-ducts ſometimes yield a mucilaginous lymph, as in the comphrey; and ſometimes a white milky glutinous lymph, as in the angelica, ſonchus, burdock, ſcorzonera, dandelion, &c. The lymph-ducts are ſuppoſed to be the veſſels from which the gums and balſams are ſecreted. The lymph of fennel, when expoſed to the air, turns into a clear tranſparent balſam; and that of the ſcorzonera, dandelion, &c. condenſes into a gum.

The ſituation of the veſſels is various. In ſome plants they ſtand in a ring or circle at the inner edge of the bark, as in aſparagus; in others they appear in lines or rays, as in borage; in the parſnip, and ſeveral other

other plants, they are moſt conſpicuous toward the outer edge of the bark; and in the dandelion they are diſpoſed in the form of concentric circles.

The Wood of roots is that part which appears after the bark is taken off, and is firmer and leſs porous than the bark or pith. It conſiſts of two diſtinct ſubſtances; (1) the pulpy, or parenchymatous; (2) the ligneous. The wood is connected to the bark by large portions of the bark inſerted into it, moſtly in the form of rays, tending to the centre of the pith, eaſily diſcernible by the eye in a tranſverſe ſection of moſt roots. Theſe inſertions, like the bark, conſiſt of many veſſels, moſtly round or oval.

The ligneous veſſels are generally diſpoſed in collateral rows running longitudinally through the root. Some of theſe contain air, others ſap. The air-veſſels are diſtinguiſhed by being whiter.

The Pith is the centrical part of the root. Some roots have no pith, as the ſtramonium, nicotiana, &c.; others have little or none at the extremities of the roots, but a conſiderable quantity near the top. The pith, like every other part of a plant, is derived from the ſeed: but in ſome it is more immediately derived from the bark; for the inſertions of the bark running in betwixt the rays of the wood, meet in the centre, and conſtitute the pith. It is owing to this circumſtance, that among roots which have no pith in their lower parts, they are amply provided with it towards the top, as in columbine, lovage, &c.

The bladders of the pith are of very different ſizes, and generally of a circular figure. Their poſition is more uniform than in the bark. Their ſides are not mere films, but a compoſition of ſmall fibres or threads, which gives the pith, when viewed with a microſcope, the appearance of a piece of fine gauze or net-work.

We ſhall conclude the deſcription of roots with obſerving, that their whole ſubſtance is nothing but a congeries of tubes and fibres, adapted by nature for the abſorption of nouriſhment, and of courſe the extenſion and augmentation of their parts.

In deſcribing the Trunks of plants, it is neceſſary to premiſe, that whatever is ſaid with regard to them applies equally to the branches.

The trunk, like the root, conſiſts of three parts; the bark, wood, and pith. Theſe, though ſubſtantially the ſame in the trunk as in the root, are often very different in texture and appearance.

1. The ſkin of the bark is compoſed of very minute bladders, interſperſed with longitudinal woody fibres, as in the nettle, thiſtle, and moſt herbs.

herbs. The outside of the skin is visibly porous in some plants, particularly the cane.

The principal body of the bark is composed of pulp or parenchyma, and innumerable vessels much larger than those of the skin. The texture of the pulpy part, though the same substance with the parenchyma in roots, seldom appears in the form of rays running towards the pith; and when these rays do appear, they do not extend above half way to the circumference. The vessels of the bark are very differently situated, and destined for various purposes in different plants. For example, in the bark of the pine, the inmost are lymph-ducts and exceedingly small; the outmost are gum or resiniferous vessels, destined for the secretion of turpentine; and are so large as to be distinctly visible to the naked eye.

2. The Wood lies betwixt the bark and pith, and consists of two parts; (1) parenchymatous, (2) ligneous. In all trees, the parenchymatous part of the wood, though much diversified as to size and consistence, is uniformly disposed in diametrical rays, or insertions running betwixt similar rays of the ligneous part.

The true wood is nothing but a congeries of old dried lymph-ducts. Between the bark and the wood a new ring of these is formed every year, which gradually loses its softness as the cold season approaches, and, towards the middle of winter, is condensed into a solid ring of wood. These annual rings, which are distinctly visible in most trees when cut through, serve as natural marks to distinguish their age. The rings of one year are sometimes larger, sometimes less, than those of another, probably owing to the favourableness or unfavourableness of the season.

3. The Pith, though of a different texture, is exactly of the same substance with the parenchyma of the bark, and the insertions of the wood. The quantity of pith is various in different plants. Instead of being increased every year like the wood, it is annually diminished, its vessels drying up and assuming the appearance and structure of wood; insomuch that in old trees there is scarce such a thing as pith to be discerned.

A ring of sap-vessels are usually placed at the outer edge of the pith, next the wood. In the pine, fig, and walnut, they are very large. The parenchyma of the pith is composed of small cells or bladders, of the same kind with those of the bark, only of a larger size. The general figure of these bladders is circular; though in some plants, as the thistle, and borage, they are angular. Though the pith is originally one connected chain of bladders; yet, as the plant grows old, they shrivel, and open

open in different directions. In the walnut, after a certain age, it appears in the form of a regular tranſverſe hollow diviſion. In ſome plants it is altogether wanting; while in others, as the ſonchus, nettle, &c. there is only a tranſverſe partition of it at every joint. Many other varieties might be mentioned.

The leaves of plants conſiſt of the ſame ſubſtance with the trunk. They are full of nerves or woody portions, running in all directions, and branching out into innumerable ſmall threads (interwoven with the parenchyma) like fine lace or gauze.

The ſkin of the leaf, like that of an animal, is full of pores, which both ſerve for perſpiration, and for the abſorption of dews, air, &c. Theſe pores, or orifices, differ both in ſhape and magnitude in different plants, which is the cauſe of that variety of texture or grain peculiar to every plant.

The pulpy or parenchymatous part conſiſts of very minute fibres, wound up into ſmall cells or bladders. Theſe cells are of various ſizes in the ſame leaf.

All leaves, of whatever figure, have a marginal fibre, by which all the reſt are bounded. The particular ſhape of this fibre determines the figure of the leaf.

The veſſels of leaves have the appearance of inoſculating; but, when examined by the microſcope, they are found only to be interwoven, or laid along each other.

What is called air-veſſels, or thoſe which carry no ſap, are viſible even to the naked eye in ſome leaves. When a leaf is ſlowly broke, they appear like ſmall woolly fibres, connected to both ends of the broken piece.

The texture, veſſels, &c. of flowers are pretty ſimilar to thoſe of the leaf.

Every flower is perfectly formed many months before it appears outwardly; that is, the flowers which appear this year are not, properly ſpeaking, flowers of this year, but of the laſt. For example, mezereon generally flowers in January; but theſe flowers were completely formed in the month of Auguſt preceding. By ſeparating the coats of a tulip-root about the beginning of September, we find that the two innermoſt form a kind of cell, in the centre of which ſtands the young flower, which is not to make its appearance till the following April or May.

In deſcribing the ſtructure of fruits, a few examples ſhall be taken from ſuch as are moſt generally known.

A PEAR, beſides the ſkin, which is a production of the ſkin of the bark, conſiſts of a double parenchyma or pulp, ſap, and air-veſſels, calculary and acetary.

The outer parenchyma is the ſame ſubſtance continued from the bark, only its bladders are larger and more ſucculent.

It is every where interſperſed with ſmall globules or grains, and the badders reſpect theſe grains as a kind of centres, every grain being the centre of a number of bladders. The ſap and air-veſſels in this pulp are extremely ſmall.

Next the core is the inner pulp or parenchyma, which conſiſts of bladders of the ſame kind with the outer, only larger and more oblong, correſponding to thoſe of the pulp, from which it ſeems to be derived. This inner pulp is much ſourer than the other, and has none of the ſmall grains interſperſed through it, and hence it has got the name of *acetary*.

Between the acetary and outer pulp the globules or grains begin to grow larger, and gradually unite into a hard ſtony body, eſpecially towards the corculum, or ſtool of the fruit; and from this circumſtance it has been called the *calculary*.

Theſe grains are not derived from any of the organical parts of the tree, but ſeem rather to be a kind of concretions precipitated from the ſap, ſimilar to the precipitations from wine, urine, and other liquors.

The core is a roundiſh cavity in the centre of the pear, lined with a hard woody membrane, in which the ſeed is incloſed. At the bottom of the core there is a ſmall duct or canal, which runs up to the top of the pear; this canal allows the air to get into the core for the purpoſe of drying and ripening the ſeeds.

In a LEMON, the parenchyma appears in three different forms. The parenchyma of the rind is of a coarſe texture, compoſed of thick fibres, woven into large bladders. Thoſe neareſt the ſurface contain the eſſential oil of the fruit, which burſts into a flame when the ſkin is ſqueezed over a candle. From this outmoſt parenchyma nine or ten inſertions or lamellæ are produced, which run between as many portions of the pulp, and unite into one body in the centre of the fruit, which correſponds to the pith in trunk or roots. At the bottom and top of the lemon, this pith evidently joins with the rind, without the intervention of any lamellæ. This circumſtance ſhews that the pith and bark are actually connected in the trunk and roots of plants, though it is difficult to demonſtrate the connection, on account of the cloſeneſs of their texture, and the minuteneſs of their fibres. Many veſſels are diſperſed through the

the whole of this parenchyma; but the largeſt ones ſtand on the inner edge of the rind, and the outer edge of the pith, juſt at the two extremities of each lamellæ.

The ſecond kind of parenchyma is placed between the rind and the pith, is divided into diſtinct bodies by the lamellæ; and each of theſe bodies forms a large bag.

Theſe bags contain a third parenchyma, which is a cluſter of ſmaller bags, diſtinct and unconnected with each other, having a ſmall ſtalk by which they are fixed to the large bag. Within each of theſe ſmall bags are many hundreds of bladders, compoſed of extremely minute fibres. Theſe bladders contain the acid juice of the lemon.

The veſſels in the roots of plants abſorb moiſture from the earth, and convey it to the trunk, branches, leaves, &c. This moiſture, when it firſt enters the root, is crude; but as it aſcends into the other parts of the plant, it undergoes ſeveral changes, by means of the different configurations of the veſſels peculiar to each part. Thus the leaves, flowers, fruit, and ſeed, have all ſomething peculiar in the ſtructure and arrangement of their veſſels, which produces conſiderable changes in the nature of the ſap. It is not known how theſe changes are produced: but how the ſtomachs of animals make chyle from animal and vegetable ſubſtances, or how urine, ſaliva, bile, &c. is ſecreted from the common maſs of blood, is as little known. The ſap likewiſe moves in a lateral or horizontal direction.

Philoſophers were greatly divided about the circulation of the ſap. Some contended that it returns to the root betwixt the bark and wood. But Hales, who has made many accurate experiments on the ſubject, has ſhown, that it does not circulate, but aſcends and deſcends in the ſame veſſels; that it aſcends in hot weather, and deſcends in cold, like the ſpirits in a thermometer.

Vegetables begin to abſorb ſap about the beginning of ſpring, and ſoon after ſhoot out their buds, leaves, and flowers.

When plants are in a ſtate of vegetation, eſpecially in hot weather, there is a great deal of ſuperfluous ſap abſorbed; but the ſuperfluity is carried off by tranſpiration. Every part of a plant tranſpires, but the greateſt quantity paſſes by the leaves.

Some have aſſigned the tranſpiration of plants as the cauſe of the motion of the ſap. It is undoubtedly one cauſe of this motion; becauſe, if the tranſpiration be ſtopped, at a time when all the veſſels are full, the motion of the ſap muſt ſtop of courſe. But then there is a previous and

principal cauſe, viz. that power in the veſſels, whatever it is, that firſt puts the ſap in motion before tranſpiration has commenced.

Heat, moiſture, and air, are the three chief circumſtances that promote the aſcent of the ſap. Hence nothing is more favourable to vegetation than warm weather, accompanied with rain: on the other hand, cold dry weather is its greateſt enemy. In a wet cold ſeaſon every thing rots; and in hot dry weather every thing is parched. But the circumſtances moſt favourable to vegetation are cloudy hot weather, inclinable to thunder, ſucceeded by plentiful rains.

It would appear very improbable, that the ſame matter could nouriſh ſuch a variety of plants, differing ſo eſſentially in ſmell, taſte, figure, &c. Much, however, may depend on the internal ſtructure and arrangement of the veſſels. If the veſſels in any plant be uncommonly ſmall, parts will be rejected by that plant which would be abſorbed by one whoſe veſſels are larger. Nay, changes may be made in the crude homogeneous nouriſhment, by a ſmall difference in the figure or action of the veſſels.

One plant will ſtarve another by robbing it of its nouriſhment, either by extending its roots, and requiring a greater quantity of nouriſhment, or by abſorbing the peculiar food which is neceſſary for the growth of the other plant.

That a poiſonous plant and its antidote will grow in the ſame ſoil, may be owing either to theſe plants imbibing different juices from the earth, or to peculiarities in the ſtructure and action of their veſſels.

A ſtalk of a lemon, grafted on a branch of an orange-tree, grew, ripened its fruit, and preſerved the figure and all the other qualities belonging to a lemon. This plainly indicates, that the organization of the lemon had given a different modification to the juices of the orange, through the intervention of which it received its nouriſhment.

It is alſo certain, that the different parts of the ſame plant have frequently various ſmells, taſtes, &c. although the nouriſhment derived from the root muſt be the ſame. This is an evidence, that the different ſtructure of parts in the ſame plants is capable of producing very ſenſible changes in the nature and quality of the ſap.

Repeated experiments ſhow, that many plants of very oppoſite qualities, and even trees, have been nouriſhed and brought to maturity by water alone.

The roots of plants are fitted to abſorb every fluid that comes within their reach. They have been found by experiment to imbibe fluids

fluids that actually poiſon them. From this circumſtance it may be fairly concluded, that they have not, like animals, the ſagacity of chooſing the food that is moſt proper for nouriſhing them, and rejecting that which is either noxious or leſs nouriſhing.

That the earth may ſupply a variety of juices is undeniable; that a plant may have pores too narrow to admit ſome is alſo undeniable: but it ſeems to me that ſomewhat alſo is to be attributed to that kind of juice to which the plant has been accuſtomed; for we know that if a number of worſted threads be hung in a baſon of oil, ſo that they abſorb the oil, and it run through them, they will not in like manner imbibe water; the oil they contain forbids it; if they are ſqueezed never ſo dry, ſo that apparently the oil were gone from them, yet what little remains will unfit thoſe threads for the abſorption of water: the ſame occurs if they had been imbued with water, they will refuſe to tranſmit oil. May it not then be, that one effect of the pulpy part of the ſeed has been to accuſtom the fibres of the ſeminal root to ſuch a juice as ſuits its nature? or have not thoſe fibres drawn from (perhaps through) that pulp a juice tinged or contaminated with its own properties, and thereby partly concocted for the aliment of the plant? to which being habituated and thoroughly drenched in it, it ever after admits paſſage to thoſe only which are of a ſimilar nature. Thus a poiſonous ſeed accuſtoms its offspring-fibres to a poiſonous juice, and perpetuates their properties. In an earth which does not furniſh ſuch a juice; the plant will not thrive, if it will live; which perhaps it *may*, by aſſimilating ſuch innocent juices as it procures, ſo far as it can, to its own nature, which yet may not be far enough to perfect its properties: whence that may be deadly in one ſoil which in another is only noxious, or that noxious in one which in another is only inſipid; and with this ſeems to agree the analogy of moſt vegetable poiſons, which often by tranſplantation loſe their moſt lively properties; and the variation of plants, corn, &c. which in one ſoil flouriſh, perhaps improve, in another degenerate; this cauſe then traces their properties to their origin, and ſhews the nature impreſſed upon them; which probably is preſerved by a greater or leſs number of each plant reſpectively always occupying a portion of earth where it meets with juices adapted to its maintenance in full vigour. It is natural to ſuppoſe that after having paſſed through ſo great a number of canals and paſſages between the root and the branches (and perhaps acquiring a tinge from many in its progreſs), it ſhould be highly impregnated ere it arrive at the fruit; where, and eſpecially in the ſeeds of that fruit, it ſhould undergo the

laſt ſtage of exaltation, and be ripened into qualities perfectly correſponding to thoſe of the tree.

That plants partake of the nature of the ſoil whereon they grow is notorious; and this in no trifling degree: plants which in a free ſoil have no nitre in them, yet yield nitre when they grow on a nitrous ſoil, as is often experienced in the nitre-works in France.

Though I have ſaid plants *may* live by aſſimilating ſuch juices as they *can* procure, yet I apprehend if there be an abſolute dearth of ſuch as are proper to them, though there be plenty of others in the ſpot where they grow, they will pine, languiſh, and die. Hence water plants cannot ſupport a dry ſoil, and heath plants are rotted by humidity. Nevertheleſs it is aſſerted, that as the deſert plains of Africa, where a parched and ſandy ſoil prohibits vegetation, yield only moſſes and lichens, ſo the higheſt Alpine regions, and the moſt rigorous northern climates, yield only moſſes and lichens alſo. Strange, that the ſame plants ſhould ſupport extremes of heat and cold, yet refuſe to flouriſh in temperate climates and richer ſoils!

I have heretofore conſidered irritability as an indefinitely lower degree of ſenſibility; for I confeſs I am unable to draw any line whereat to diſtinguiſh theſe principles. The irritability of plants is a curious ſubject: but not yet entirely elucidated. It is not always alike, but capable of increaſe and decreaſe; is ſaid to be greateſt in the morning, leſs at noon, ſtill leſs in the evening; greateſt in ſpring, leſs in ſummer, ſtill leſs in autumn: whether it be recruited by winter torpidity, therefore moſt abundant in ſpring, or by nightly repoſe, therefore moſt abundant in the morning; or whether it may not depend on the different ſtates of the atmoſphere, which in ſpring and morning is humid and cool, is ſubmitted. That humidity is grateful to plants is clear; that coolneſs conſtricts their fibres, as heat renders them flaccid, looſe, and therefore probably inert, by reaſon of a ſmaller degree of tenſion, is alſo clear. Whether this latter cauſe may not influence thoſe plants which apparently follow the ſun has been doubted: for if thoſe parts of the ſtem whereon his rays fall moſt immediately are thereby rendered weaker than thoſe not expoſed to his rays, doubtleſs they will give way, and the flower will bend to that ſide: if this be granted, then, that coolneſs ſhould conſtrict the fibres of plants, that conſtriction ſhould act principally on thoſe parts which had been expanded, *i. e.* the flowers, is natural. That coolneſs obtains before rain, and in the evening, is certain; and on this principle the cloſure of certain plants and flowers is thus accounted for: but as

ſome

ſome are opening and cloſing at all times (inſomuch that Linnæus, by obſerving their ſtate, informs us we may know the hour of the day, and hence calls them *Flora's Watch*), and as others open only during night, this cauſe ſeems inadequate to ſo great variety of effects. What is termed the ſleep of plants, is ſuppoſed to proceed from exhauſtion of irritability, and is moſt obſervable in young plants, and in ſpring.

The *Mimoſa*, or *Senſitive Plant* (of which Linnæus reckons forty-ſix ſpecies) is the great inſtance of irritability; as, beſide contracting its leaves in the evening, it may be made to contract them at any time, by the touch of the hand, the fumes of volatile alkali, the electric ſpark, muſk, or opium: and this contraction is ſo powerful, that, on its taking place, the leaves may be eaſier broken than re-expanded; but the plant will regain its natural ſtate after an interval of from ten minutes to half an hour. Immerſion in water does not produce theſe effects. Their general progreſs is according to the force or quantum of ſtimulus engaged on the plant, affecting firſt one leaf, then its fellow or pair on the ſtalk, then the pedicle or foot-ſtalk, moving upwards, then all the leaves on that branch, then the branch to the very ſtem of the plant. A ſhaking motion affects the whole plant; but it is poſſible to affect the branches and not the leaves.

That plants are greatly affected by the impulſe of light, appears not only from what we have ſaid when treating of light, but from the inſtance of this very plant. A ſenſitive plant, placed in a dark cave, was twenty-four hours before it expanded, and then very partially; ſuffered no change at night or morning; but being placed in the open air, recovered its natural ſtate and irritability. Another, kept in a dark room during ſome hours after day-break, did not expand; but, reſtored to the light, expanded without delay.

According to the ſtructure of plants they ſhew their irritability in various manners: the *Dionea Muſcipula*, or Venus's fly-trap, is ſo called, becauſe, if an inſect enter its flower, deſigning to taſte its ſweets, the leaves cloſe upon him, and hold him beyond his powers to extricate himſelf.

Paraſitical plants, which grow on other trees, as the miſſeltoe, or which climb on other trees, as the ivy, and numberleſs others, are a curious claſs of plants; many of which never drew nouriſhment from mother earth, but from their ſupporting tree, which they often ſtrangle and deſtroy. In hot countries theſe are often ſo noxiouſly abundant, no art can exterminate them.

Vegetables are greatly expoſed to the depredations of inſects: almoſt every plant has numbers attached to itſelf, and many ſuffer by ſeveral in ſucceſſion; being while juſt ſprouting the favourite food of ſome, when further advanced of others, and when mature of others. To this cauſe has been attributed the blight of corn.

Vegetables, when decayed, compoſe that kind of earth or mould, which of all earths is beſt adapted to nouriſh vegetable life, and indeed without which no fertility can be expected. Hence, if in a ſandy ſoil that plant which can ſupport ſuch a ſoil be cultivated, and left to rot, then another crop of the ſame ſucceed, and be ploughed in, by degrees the ſandy ſoil will become mixed with vegetable earth, and after a while will be capable of nouriſhing whatever plants are committed to its boſom.

Vegetation is no leſs ſtrong in the water than on land; in the ocean than on the plains: nor is it confined to plants, but produces large trees of ſolid wood. Of theſe we muſt expect to continue ignorant, except as accident diſcloſes them. Can thoſe which grow in perpetual darkneſs be ſtimulated by light? Have thoſe variations of irritability which dwell in a medium invariably cold and denſe, often perhaps ſtagnant and motionleſs?

Thus we have endeavoured to illuſtrate the generation, growth, ſtructure, and nutrition of vegetables: their numbers forbid extending our diſquiſitions, and their properties are various as their numbers; however, we ſhall juſt obſerve, that ſome are *poiſonous*, and in certain inſtances ſo ſtrongly as to poiſon the air around them. We have an extraordinary relation of a great tree of this nature in Japan, to which only condemned criminals are ſent to gather its gum: they approach the tree to windward, yet few return to claim exemption from further puniſhment. Another and a well authenticated inſtance is the manchineel tree, under whoſe branches ſhould an unwary traveller take refuge, the drops of rain falling from them would at leaſt corrode and bliſter his ſkin, if he eſcaped ſo. Our own yew has ſimilar, though very greatly inferior, reputation among ſome. Nor ſhould opium be forgotten, which is yielded by the white poppy, cultivated for that purpoſe in the Eaſt: in ſmall quantities this promotes ſleep; in large quantities fatal ſleep. By habit the Eaſtern people can eat it in lumps, and drinking a glaſs of cold water after it, experience merely intoxication; yet gradually it ſhortens their days, produces decrepitude, and undermines the natural powers. The number of plants having poiſonous qualities is conſiderable; and

much diſcretion, or rather knowledge, is requiſite to diſtinguiſh ſome of them from ſalutary herbs. Many of them are berry-bearing, and their berries delude the eyes of children not without riſque.

Mankind, expoſed to inclement ſeaſons, will ever be beholden to vegetables for ſhelter: hence our obligations to timber trees of all ſorts, from the ſtately oak of which ſhips are conſtructed, to the ſlender oſier which yields only wattles: this is too obvious to require enlargement; and even ſuppoſing they furniſh no edible fruit for our ſupport, or that of animals for our uſe. But by fruit-bearing trees we are doubly accommodated, not only with ſhelter but with food, not only with wood but with proviſion: hence the apple, pear, plum, peach, cherry, and many others, are highly valuable; they furniſh our tables with a deſſert, and delight our palates with their vivacity and reliſh. The vine, indeed, boaſts no wood for beams, or for furniture, but its fruit is noble, and, temperately uſed, invaluable. All nations have had recourſe for cheering drinks to infuſions, or to the ſap, of vegetables. I ſhall not enlarge on the variety of fruits; on their ſucceſſions, each in its ſeaſon; on their qualities of preſervation, and indeed improvement by keeping; nor on their profit, in that what is not fit for our uſe has many animals awaiting its donation, to whom it is grateful though imperfect.

Grain is a part of our proviſion, on which we depend with the utmoſt aſſurance; whoſe abſence nothing can ſupply; whoſe loſs nothing can compenſate. Happy for us not only that it is fertile and productive, but that, after many years keeping, its nutritive qualities are not impaired.

Garden vegetables preſerve us in health: they unite delicacy of taſte to ſalubrity; they offer us choice either of roots or plants, either of pulſe or herbs; ſome for preſent uſe, others for ſtores. If we quit the kitchen garden for the parterre, we are enlivened at the ſight of blooming flowers, and regaled by their odours: ſometimes they yield us ornament, ſometimes perfume, ſometimes a remedy, always a moral. Some we ſubmit to the ſtill, of ſome we extract the eſſences, of ſome we preſerve the forms, and others, which we cannot preſerve, we imitate. Such delight have we ever taken in flowers!

For perſonal accommodation we praiſe the flax, whoſe beaten fibres yield elegance and health: nor let us forget the hemp, whoſe hardy ſtalks furniſh our ſhips with wings. The moſt immenſe ſail is but an union of hempen threads; the ſtrongeſt cable is but a combination of twiſts, weak aſunder, but their united ſtrength reſiſts the rolling waves,

enſuring ſecurity to the adventurous mariner, amid the ſwellings of the mighty deep.

It is evident, that to underſtand, though but remotely, the relations of theſe ſo different ſubjects, diſcrimination is both deſirable and neceſſary: ſince they are not alike, we may juſtly ſeparate the different, and combine the ſimilar; to accompliſh which purpoſe is the deſign of botanical ſyſtems.

Smell and taſte give us ſome intimation of the nature and qualities of plants. An agreeable taſte or ſmell is ſeldom accompanied with noxious qualities; on the other hand, when theſe ſenſes are diſagreeably affected, the qualities are generally more or leſs noxious, being either purgative, emetic, or poiſonous. Plants that have a ſweet taſte are generally nutritive; thoſe that have a ſalt taſte are warm and ſtimulant. Plants of an acrid taſte are corroſive; but, when deprived of their acrimony by drying, ſome of them become fit for food. Bitter plants are alkaline, ſtomachic, and ſometimes of a ſuſpicious nature. Acid plants are cooling, and allay thirſt; but thoſe of an auſtere taſte are aſtringent.

The colour and aſpect of plants throw ſome light upon their nature. Flowers or fruit of a red colour are generally acid. Yellow flowers indicate a bitter taſte. Plants that have green flowers are crude; thoſe of a pale colour are commonly inſipid; thoſe of a white colour are generally ſweet; and thoſe whoſe flowers have a gloomy and diſmal aſpect, are moſtly poiſonous.

In order to bring the numerous tribes of vegetables under certain claſſes or denominations, various methods have been adopted by different authors. Some have claſſed them by the figure of their roots; ſome by the caulis or ſtems; ſome by the leaves. Linnæus has preferred the parts of fructification, becauſe theſe are not only the moſt eſſential, but likewiſe the moſt univerſal.

This method of claſſing is preferable to any that has been propoſed, on many accounts. It is found by experience, that plants which are diſtinguiſhed by the ſame characters in the flower and fruit, have the ſame qualities, though not always in an equal degree as to ſtrength or weakneſs; ſo that, upon inſpection of the flower and fruit, a botaniſt can determine *à priori* the effects that will reſult from the plant when taken into the ſtomach.

This method of reducing plants to claſſes, genera, and ſpecies, is founded upon the ſuppoſition that vegetables propagate their ſpecies in a manner ſimilar to that of animals. Linnæus endeavours to ſupport this hypotheſis

hypotheſis by the many analogies that ſubſiſt between plants and animals. From this circumſtance Linnæus's ſyſtem of botany has got the name of the *ſexual ſyſtem*. The names of his claſſes, orders, &c. are all derived from this theory. He calls the ſtamina of flowers the *males*; the piſtils *females*. Plants whoſe flowers contain both male and female parts, are ſaid to be *hermaphrodites*, &c. His claſſes, orders, and genera, are all derived from the number, ſituation, proportion, and other circumſtances attending thoſe parts.

Twenty-four claſſes comprehend every known genus and ſpecies. It is an eaſy matter to claſs a plant belonging to any of the firſt eleven claſſes, as they all depend on the number of ſtamina or male parts, without regard to any other circumſtance. The 12th claſs requires more attention. When the ſtamina amount to above 20, particular regard muſt be had to the inſertion of the ſtamina. If they are inſerted into the calix or cup, the plant belongs to the icoſandria claſs; if to the receptacle or baſis of the flower, it belongs tothe polyandria.

The 14th claſs is likewiſe in danger of being confounded with the 4th. In the 4th, the number of ſtamina is the ſame with that of the 14th. But, in the 14th, two of the ſtamina are uniformly much ſhorter than the other two; at the ſame time each particular ſtamen belonging to the different pairs ſtands directly oppoſite to one another.

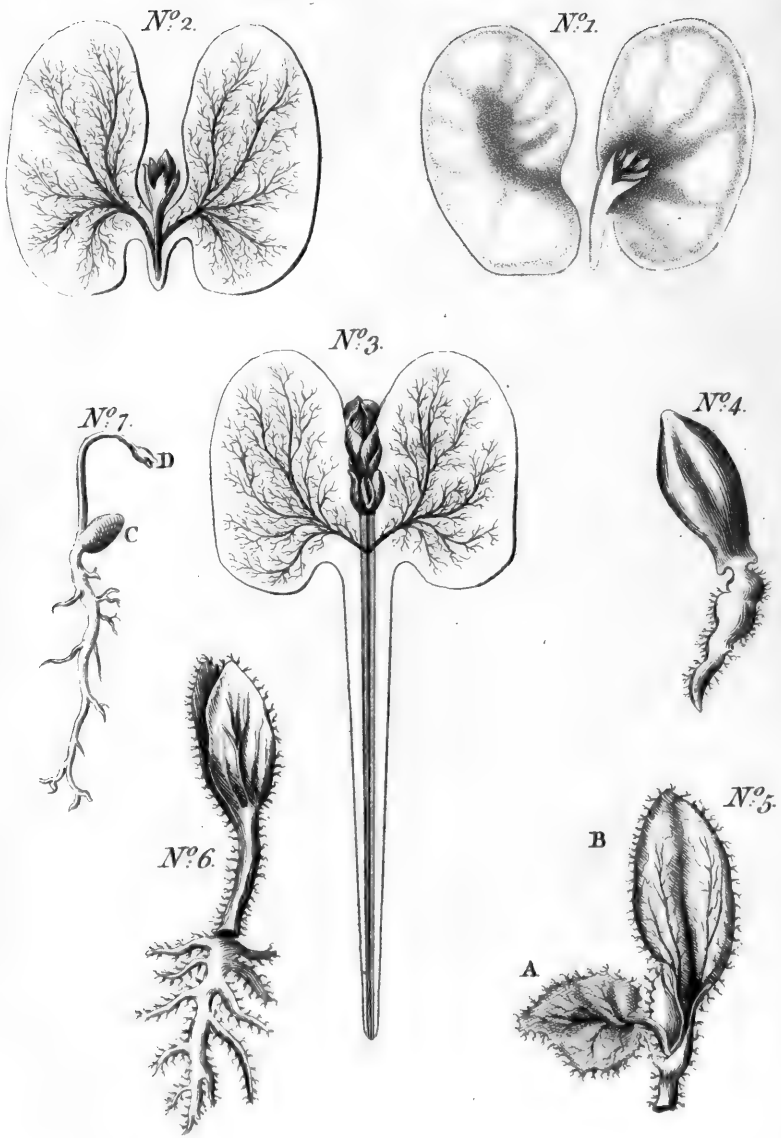
The 15th claſs may be miſtaken for the 6th, as they conſiſt of the ſame number of ſtamina. But in the 15th, four of the ſtamina are uniformly longer than the other two; and theſe two are always oppoſite to each other.

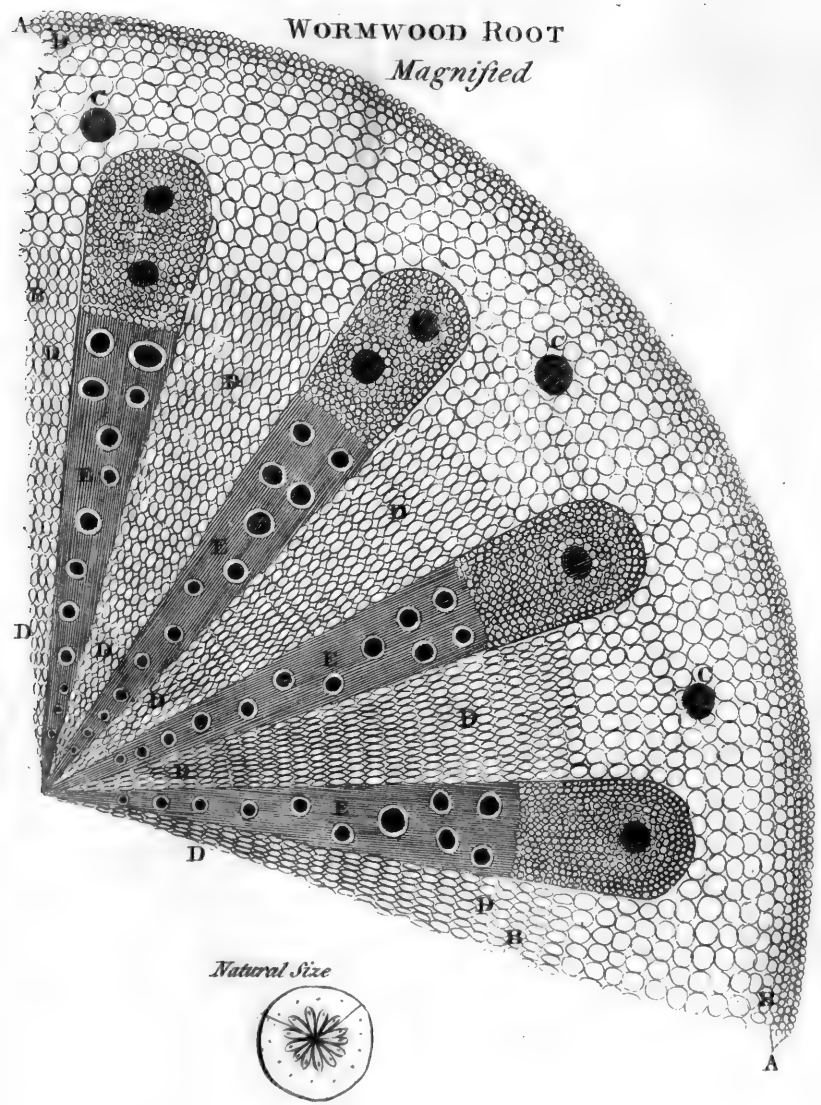
SCHEME

PLANTS are united

- Either publicly, *i. e.* have visible flowers.
  - *Monoclinia*, males and females together:—*i. e.* The flowers all hermaphrodite, having stamina and pistils in the same flower.
    - *Diffinitas*, the males or stamina unconnected with each other.
      - *Indifferentissimus*, the males or stamina having no determinate relative proportion as to length.
        1. MONANDRIA, *i. e.* one male or stamen in a hermaphrodite flower.
        2. DIANDRIA, —— two males or stamina.
        3. TRIANDRIA, —— three males.
        4. TETRANDRIA, —— four males.
        5. PENTANDRIA, —— five males.
        6. HEXANDRIA, —— six males.
        7. HEPTANDRIA, —— seven males.
        8. OCTANDRIA, —— eight males.
        9. ENNEANDRIA, —— nine males.
        10. DECANDRIA, —— ten males.
        11. DODECANDRIA, —— eleven males.
        12. ICOSANDRIA, —— twenty, or more males inserted into the calix, and not into the receptacle.
        13. POLYANDRIA, —— all above twenty males inserted into the receptacle.
      - *Subordinatio*, two of the males or stamina uniformly shorter than the rest.
        14. DIDYNAMIA, —— four males, two of them uniformly shorter than the other two.
        15. TETRADYNAMIA, —— six males, two of which are uniformly shorter than the rest.
    - *Affinitas*, the males or stamina either connected to each other, or to the pistillum,
      16. MONODELPHIA, the males or stamina united into one body by the filaments.
      17. DIADELPHIA, the stamina united into two bodies or bundles by the filaments.
      18. POLYADELPHIA, the stamina united into three or more bundles by the filaments.
      19. SYNGENESIA, the stamina united in a cylindrical form by the antheræ.
      20. GYNANDRIA, the stamina inserted into the pistillum.
  - *Diclinia*, males and females in separate beds; *i. e.* plants that have male and female flowers in the same species.
    21. MONOECIA, male and female flowers in the same plant.
    22. DIOECIA, male flowers in one plant, and females in another, of the same species.
    23. POLYGAMIA, male, female, and hermaphrodite flowers in the same species.
- Or clandestinely, *i. e.* whose parts of fructification are invisible.
  24. CRYPTOGAMIA, the flowers invisible, so that they cannot be ranked according to the parts of fructification.

GARDEN BEAN




WORMWOOD ROOT
Magnified
A
B
C
D
E
Natural Size

OBSERVATIONS

ON THE

PLATES belonging to the DISCOURSE.

GARDEN BEAN.

NUMBER I. Shews the ſtate of this ſeed previous to its being committed to the earth: the future plant is very apparent, and ſurrounded by the pulpy matter that is afterwards to afford it nutriment. That a ſimilar plant occurs in other ſeeds, is evident to whoever will open plums, cherries, &c. carefully.

No. 2. The ſeed having been a few days in the earth, the germ is beginning to ſhoot upward, and draws nouriſhment from a ſyſtem of minute veſſels, diſtributed throughout the pulpy part of the ſeed.

No. 3. The root ſhooting ſtrongly downward in ſearch of nouriſhment, which it may contribute in addition to that furniſhed by the minute ramifications diſperſed throughout the pulp.

No. 4. Is the ſtate of the bud of a gourd when it has been ſome time in the earth, ſhewing the root ſtriking into the ground.

No. 5. Shews the little plant iſſuing from between the two ſeminal leaves (A B); the ſeminal leaf A being bent downward: the root is cut off.

No. 6. Shews the root making further advances into the earth, and ſhooting deeper, while the ſeminal leaves are riſing into the air.

No. 7. The kernel of an orange in a progreſſive ſtate. C, the ſeminal leaf having done its duty, now about to become rotten.

WORMWOOD ROOT, *magnified.*

A. The ſkin with its veſſels; ſmall and cloſe.

B, B. The bark, exhibiting a regular ſyſtem of little cells and ſap-veſſels.

C, C, C. Lymph ducts in the bark.
D, D, D. Parenchymatous inſertions from the bark, with the cells, &c.
E, E, E. The rays of the wood, wherein the holes are air-veſſels.
N.B. This root has no pith.

ASH BRANCH, *magnified.*

A. The bark.
B, B, B. An arched ring of ſap-veſſels, adjoining the ſkin.
C, C. The parenchyma of the bark, with its cells, and another ring of ſap-veſſels anſwering the former, but ſituated more internally.
D. A line of lymph-ducts immediately adjoining the ſecond arched ring of ſap-veſſels.
E, E. The wood.
F. The firſt year's growth.
G. The ſecond year's growth.
H. The third year's growth.
I. The true wood.
K. The great air-veſſels.
L. Leſſer air-veſſels.
M, M, M. Parenchymatous inſertions of the bark, radiating to the centre.
N. The pith.
O. Its bladders or cells.
N. B. The G in the centre ſhould have been O.

VINE LEAF, *magnified.*

Fig. 1. The appearance of the air-veſſels to the eye, in a vine-leaf gently drawn aſunder.
Fig. 2. A ſmall piece of that leaf.
Fig. 3. The ſame magnified, in which the veſſels have the appearance of a ſcrew.
Fig. 4. The appearance of theſe veſſels as they exiſt in the leaf before they are ſtretched out.

PART

VINE LEAF

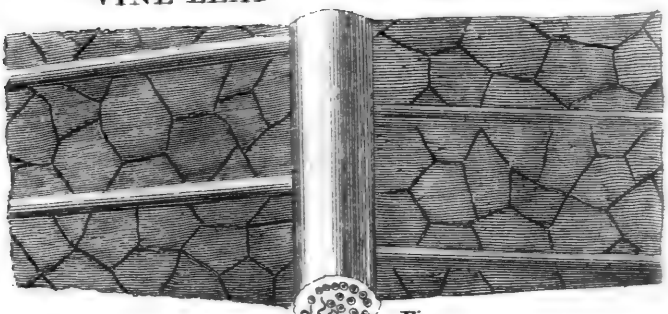


Fig. 3.

Fig. 1.

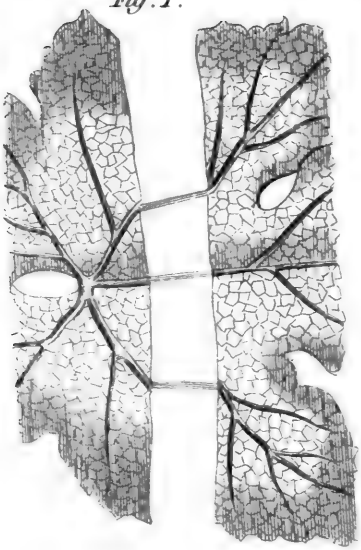
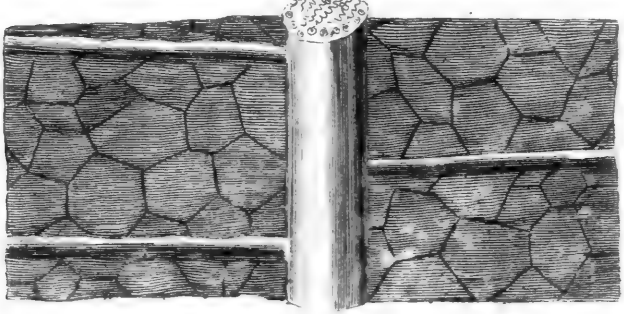


Fig. 4.

Fig. 2.



Part of an ASH BRANCH *Magnified*

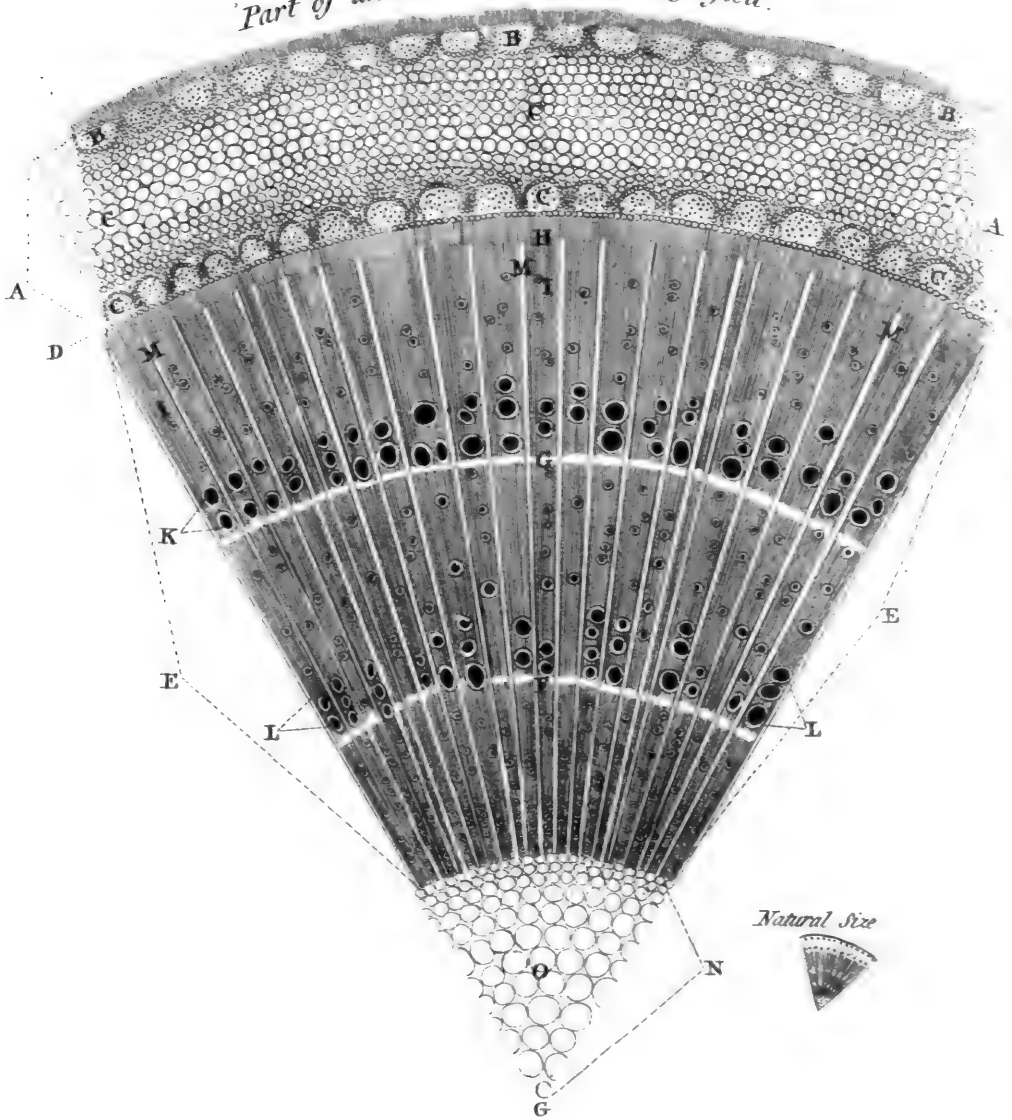
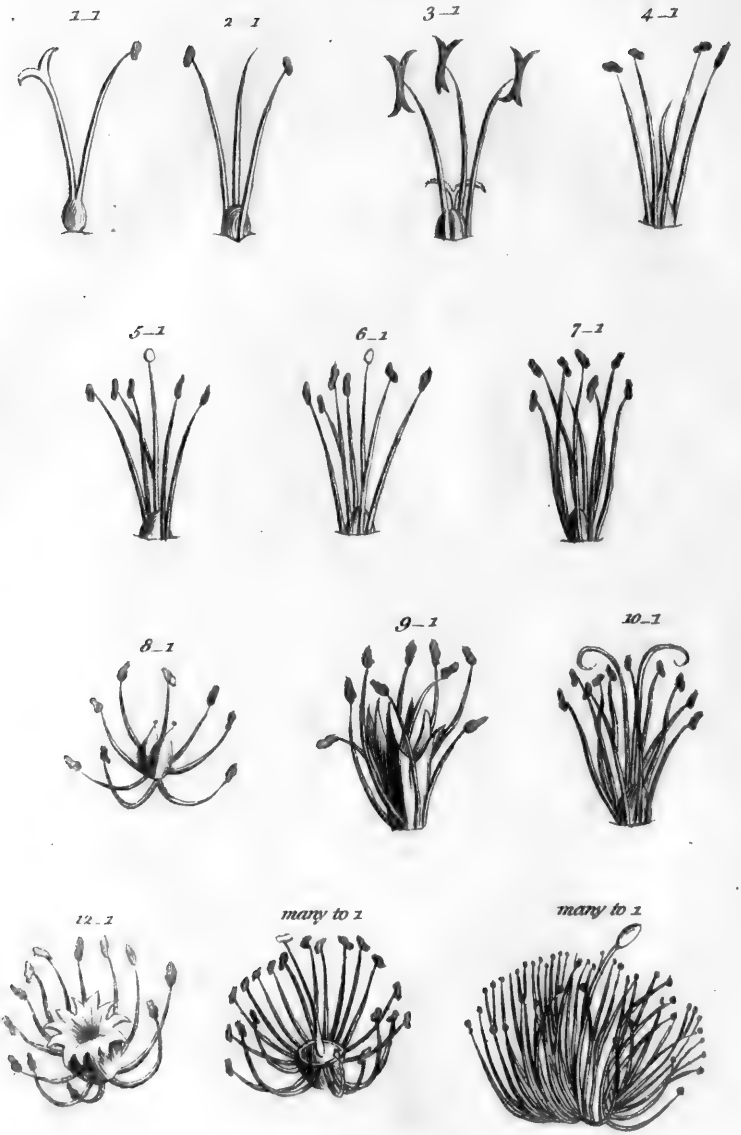


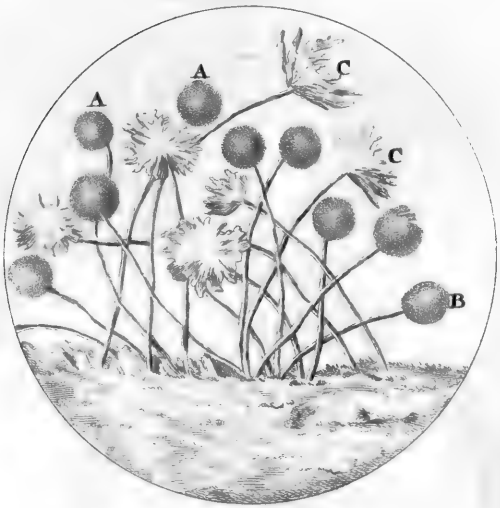
Plate II.

FLOWERS.

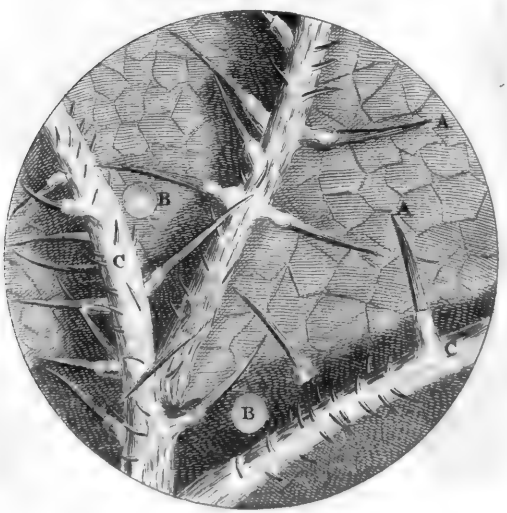
FLOWERS.



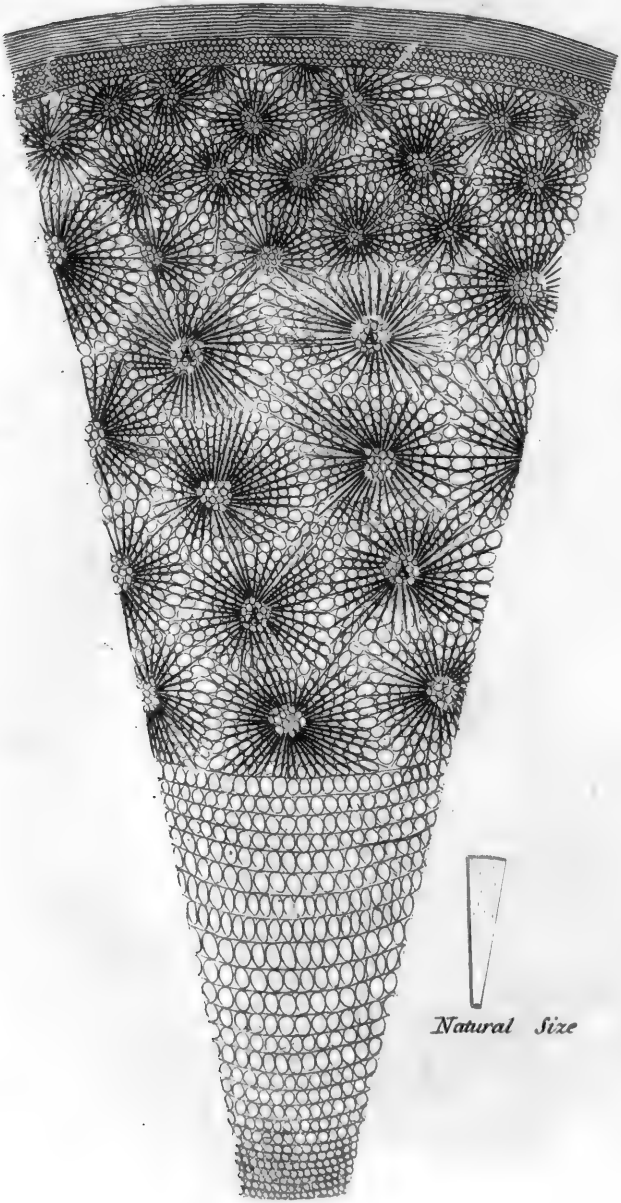
Mouldineſs



Stinging Nettle



Part of a PEAR *Magnified*



Natural Size

PART OF A PEAR, *magnified.*

Shewing the rind and its veſſels, the calculary and acetary.

A, A, A. The little grains or globules, with the veſſels radiating from them.

F L O W E R S,

Two plates; are fully explained by the method of claſſification according the ſexual ſyſtem in page 358.

M O U L D I N E S S.

This plate exhibits the minuteneſs of vegetation, and ſhews, that what we call mouldineſs is in reality only a colony of plants. This figure was a ſpot found on the red ſheep-ſkin cover of a book. The plant has long ſlender ſtalks, ſurmounted by a knob or ball: many of theſe were round and ſmooth, as A A; others ſmooth, but not round, as B; others broken and expanded in various degrees, as C C. The whole was tender, and in ſubſtance like the common muſhroom. This plant is part of a very numerous tribe, whoſe limits of duration perhaps are but ſhort, but which compenſate this brevity by ſurpriſing fecundity and rapid maturity.

STINGING NETTLE.

This ſhews the whole ſurface of the leaf, thickly ſet with ſharp thorns and prickles, A A, each conſiſting of two parts; one ſharp and tapering to a point; the other thicker, being a cavity containing a liquor to be ejected from the point into the wound it has made, in the ſame manner as a viper's fang. B, is a ſort of pearl-like tranſparent globules that grow interſperſed on the leaf, much like oak-apples on the leaves of the oak. C C, the ribs or ſap-canals, whence all the prickles iſſue, and which furniſh the juice they emit. The ſmaller prickles have no juice.

OBSERVATIONS on ſundry PLATES

Belonging to the SECOND VOLUME of the SURVEYS OF NATURE.

THE LAPLANDER is repreſented clothed in ſkins, and holding a *Rein deer.*

The CHINESE is dreſſed in ſilks, *be-dragoned*, according to the cuſtom of his country, as are alſo his flat ſword and his little *queue* of hair.

The AFRICAN is diſtinguiſhed as well by his colour as his woolly hair.

The HOTTENTOTS are in two groups: that below from *Kolben*'s account of the Cape of Good Hope; that above from an original (with remarks) by Dr. *Spaarman.*

The NORTH AMERICAN claims Mr. *Weſt* as its author; the high feathered head, the bow, and the belt of wampum, diſtinguiſh him.

WALLACHIAN SHEEP exhibit a remarkable diverſity of horns, little to be expected by the ſpecimens of this animal in our country: this race is ſaid to be conſtant in Crete.

The BLACK WOLF, here repreſented, was native of Canada, and leſs than the Alpine wolves.

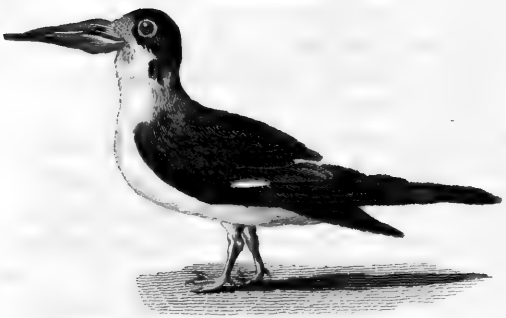
The FLYING SQUIRREL of this plate is native of India. His attitude ſhews the membranous expanſion between his hind and fore legs, on which his flight depends; (*vide* the Bat). He is larger than the kinds mentioned p. 99; but differs in little elſe, though his colours and ſpots vary.

The COAITA is given as exhibiting not only a remarkable formation in the hands, but alſo as an example of a prehenſile tail.

The WHITE BEAR is the great Greenland bear, not the terreſtrial white bear.

The ANT-BEAR. The ſnout of this animal is too long by a quarter its length, (ſtuffed ſkins are apt to occaſion ſuch miſtakes); alſo it ſhould taper more at the end: the ſtreaks on the back are too diſtinct.

The BAT, *fig.* 1. Repreſents this creature in a ſtate of repoſe. The front-arm (A C) is very long, extending obliquely downwards and forwards to the noſe; the knuckle (C) reſts on the ground, and the thumb only (D) appears; the knee (B) is elevated up to the back (E); the leg is vertical, and the five toes (G) of the hind leg are of equal length and



The Cut-water *or* Scifsor-bill

and diverging. In this view many parts are hidden by others coming before them. That by this almoſt contradictory conformation of parts, the bat ſhould be a heavy walker, and indeed rather drag itſelf along than walk, is no wonder; his gait is tottering, and he is often in danger of falling ſideways.

Fig. 2. Shews this animal in a flying ſtate; to accompliſh which he ſpreads his fingers (or thoſe long *radii* from M), and extends his membranous ſides, which are ſo thin they are almoſt tranſparent, yet very ſtrong. A the arm, B the fore arm, M the thumb, C, D, E, F, the extended fingers, which are further ſeparated from each other in the order mentioned; the membrane between theſe aſſumes a *hollowed* form, G, H, I, K (near the tail L). When the bat ceaſes flying, he ſhuts the fingers cloſe on the fore-arm, thereby folding the membrane into a ſmall compaſs, and preſenting to the air a leſs ſurface, yet equal weight, he deſcends and repoſes. Other flying creatures have no ſuch long radii of fingers (vide *Flying Squirrel*).

The Flamingo. The head of ſome is rather ſmaller in proportion.

The Avocetta. All birds bills of this kind do not turn up equally, but ſome more, ſome leſs, and are not of equal length.

The Combatant is given in both ſtates, to exhibit the remarkable diſſimilarity of this bird when full feathered and when moulted.

The Cut-Water. This bird, from the conformation of his bill, which is compoſed of two very unequal pieces, can neither peck nor gather his food: his upper mandible falls into his lower, like the blade of a razor into its haft, ſo that the bird is reduced to glide over the ſurface of the ſea, and with his lower mandible furrow the water, in order to catch ſuch fiſh as are near, or on, the ſurface; hence his name. The point of his bill is black; near the head red, as are his feet: ſize of a ſmall ſea-mew. The upper part of his body, the front of his neck, and forehead, white; ſome white on his wings; the reſt of his plumage black, or brown-black, more or leſs. Inhabits Carolina and Guyana; go in troops; almoſt always on the wing: their wings are long, yet they fly ſlowly, the better to perceive and ſeize their prey.

The Ostrich. The neck of ſome is rather longer in proportion.

The Crocodile given in the plate, is the *long-ſnouted* crocodile, or that of the Ganges; which is ſimilar to the Siameſe deſcribed in page 151.

The Guano. His pouch is in its ſwelled ſtate; the riſings on his back are rather too ſtrongly marked, and rather too much in lines.

The Cameleon is in his puffed-up ſtate.

The RATTLE-SNAKE, plate II. ſhews the peculiar parts of this reptile, ſeparated and diſtinct.

The *head*. At the extremity are the noſtrils (A); between them and the eyes are (B) two orifices ſuſpected to be the organs of hearing, but which lead into a bone, hollow, but not peforated C, ſhews the teeth of this ſerpent ſeated in each jaw. D, the fangs through which the poiſon paſſes, placed forward in the mouth: only the firſt (which is the largeſt) fixed to the bone, the others to tendons; their mechaniſm has been deſcribed. E, the ſituation of the bladders of poiſon. F, the larynx, not with a variety of cartilages, but formed ſo as to make a ſlit for the admiſſion of air; whence the hiſſings of ſerpents. G, the forked tongue, compoſed of two round bodies, joined two thirds of its length; the part outſide the ſheath is black, that within it red: the under jaw is here divided (as at I) for its readier paſſage, and the teeth in this jaw (H) are on each ſide this diviſion, that they may not injure the tongue.

The *Rattle*. The formation of the firſt rattle. *a*, the latter vertebra of the tail: *b*, the muſcle on which the rattle is faſtened: *c*, a ſingle rattle, ſhewing its riſings whereby it is held by following rattles, being inſerted into their hollows; alſo its hollows whereby it holds the riſings of the following rattles: *d*, five rattles joined together, viewed as they appear externally.

The *poiſonous fangs* are given at large, that their orifices, form, and conſtruction may appear more plainly.

The SWORD-FISH frequents our coaſts, but is more abundant in the Mediterranean, where its fiſhery is a conſiderable object, eſpecially on the coaſt of Sicily, near Italy. It is much eſteemed by the Sicilians. The ſeaſon is in ſummer. They are ſtruck with a ſpear; are ſaid to be very voracious, and great enemies to the tunny, who are affirmed to be terrified at the ſight of them, probably for the ſame reaſon as the whale is at the ſaw-fiſh. It grows very large: the head and pectoral fins of one weighing ſeventy pounds; the ſnout three feet long, rough and hard, but not enough to penetrate ſhips. The ſnout is the upper jaw greatly prolonged; it is compreſſed at top and bottom, ſharp at the point: the under jaw is ſharp but ſhort; no teeth: the ſkin is rough but very thin: colour of the back duſky; the belly ſilvery.

The Sword-fish.

Sea Stars

Sea Pens

PINNA MARINA.

This is of that kind whoſe edges are rounded; it is the largeſt known, being uſually two feet in length, ſometimes more: it attaches itſelf to rocks by long ſtrings not unlike ſilk, which are called *byſſus*, and uſed for making ſome kinds of ſtuffs.

PHOLADE.

This claſs of ſhell-fiſh vary in the number of pieces which form their ſhell; ſome have four, others five, and ſome eight.

This figure is compoſed of eight pieces, viz. two large ones, D D; two others long and thin E E, placed toward the opening of the ſhell; a very ſmall one indicated by F F, uniting the above; and a long ſlip G adjoining to F, and running down the ſhell: beſide theſe are two others channelled, and running down the internal face of the ſhell. This ſhell is entirely white; the two large pieces ſlightly channelled.

NAUTILUS.

This figure repreſents the ſhell internally and externally. The chambers of the firſt deſerve our notice: they are ſeparated by thin partitions, pierced, each in its centre, by an orifice of communication running throughout the whole. The colour of this ſhell is yellowiſh, with croſs bands deeper coloured, and almoſt brown.

SEA STARS

Are marine animals divided into many points or rays, but generally five; they are covered by a ſkin, more or leſs tough, hard, or leathery. If one of their rays be broken off, they regain the deficiency in a little time, ſometimes growing from the place of the old one, ſometimes from one ſide of it.—The under face in almoſt all kinds is different from the upper, and concave or hollow; while the upper is convex, and moſtly ſmooth, having no channels. The mouth is in the under face.

Of the firſt of theſe the rays are divided by deep channels, fringed as it were by points, thin and flatted; the whole of this face is covered by little grains the ſize of a ſmall pin's head. Inhabits moſt ſeas.

The ſecond has much thinner rays, with longer fringes, cylindrical and pointed; the part between is covered above and below by little thin plates, diſpoſed like the ſcales of a fiſh; the centre or body is granulated, extremely finely, both above and below. The colour of this ſubject is brown. Is found at St. Domingo.

SEA PENS

Are a kind of marine inſects, denominated from their reſemblance to a writing pen: the middle, which correſponds to the *quill* of the pen, is a cartilaginous ſubſtance, in colour a clear brown; the *feathers* of the pen are whitiſh, hollow like the body, but leſs ſolid, and partly allied to the rays of ſea ſtars. The fleſh of the animal occupies the whole; is at leaſt the ſize of a pen, often more. Is found in the Eaſt Indies.

The ſecond differs from the former in having its lateral branches or feathers furniſhed with other ſmaller filaments, very thin: its colour varies from red to white; the reddeſt are moſt deſired. Is found as well in the European as Indian ſeas.

SEA URCHINS

Are diſtinguiſhed from ſea ſtars by not being divided into rays, but having numerous ſpikes iſſuing from ſmall knobs diſpoſed over the ſurface. If one of theſe points or ſpikes be broken off, they regain the deficiency. It has been hinted by ſome, that poſſibly they change their ſhell like crabs, &c.: it is certain that, when broken or pierced, they quickly reſtore it. Some are quite flat, and have no points. The mouth is on one ſide, the anus on the other, commonly directly oppoſite.

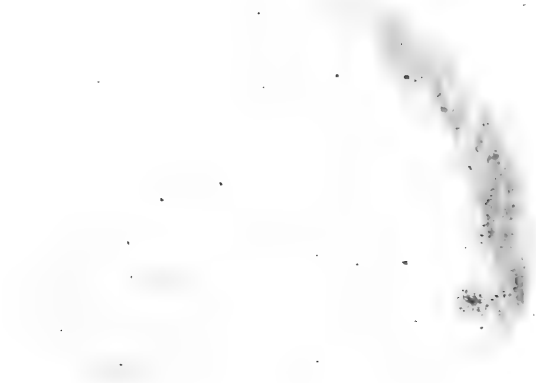
No. 1. Is not round, but approaching to oval, flat on one ſide, convex on the other: its convex ſide is repreſented; its mouth is on the other ſide: colour brown. It has a great number of very fine and ſhort aſh-coloured points: four deep fiſſures on its convex ſide, none on its flat ſide. Found at St. Domingo.

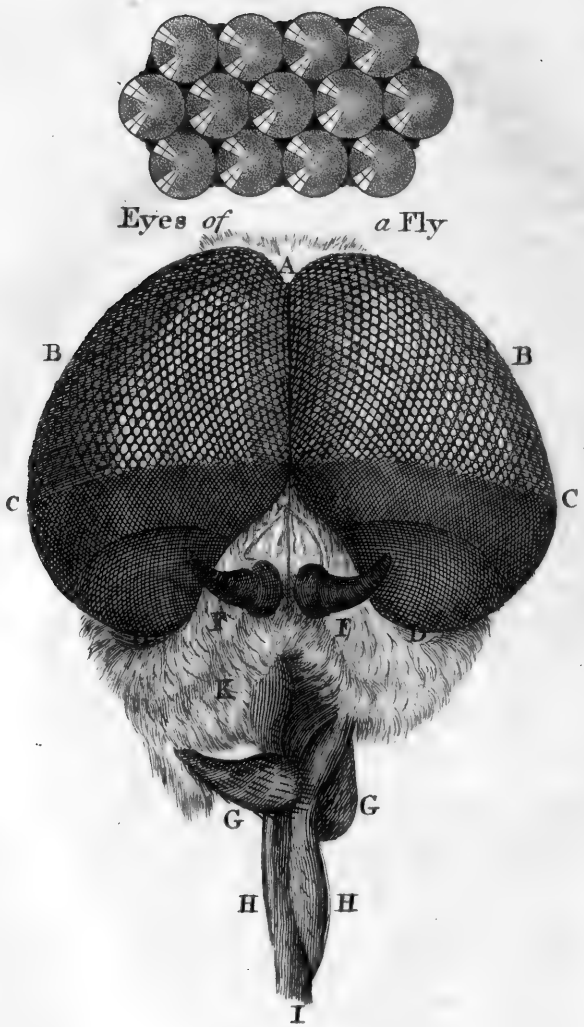
No. 2. Is ſeen on that ſide where its mouth is (which has five teeth): this urchin has two ſorts of points, one ſhort, flatted, ſmooth, and whitiſh; the other much longer, of an unequal or roughiſh ſurface, and reddiſh colour. Is found in America.

No. 3. Has a very great number of points, principally on the convex face and ſides; is of a fine violet colour. Found in the Mediterranean.

No. 4. Is very convex on one of its faces; the opening ſeen is the anus. The colours of this urchin are ſtripes of green and white alternately. The little knobs which cover its ſurface have uſually each a little ſpike of a quarter of an inch long; ſome green, ſome white: theſe break off eaſily when the animal is dead. Native of the Weſt Indies.

No. 5. Is extremely thin and flat; thickeſt in the middle, thinneſt toward




Eyes of a Fly
A
B
B
C
C
F
F
D
E
G
G
H
H
I

toward the edge: the mouth and anus are both on the ſame face, and near together. On the upper face the figure of a five-petaled flower: around it ſix oval openings, having no apparent communication with the internal parts; points only within theſe openings. Native of the Weſt Indies.

No. 6. Is white and flat, like the foregoing; differs by a kind of inciſions which almoſt reſemble the appearance of a fringe; in other reſpects is ſimilar.

The Head and Eyes of a Drone Fly, *magnified.*

This inſect is remarkable for a large head and cluſters of eyes: the greateſt part of the head conſiſts of two ſemi-circular protuberances or eyes, A, B B, C C, D D; whoſe ſurfaces are repleté with minute hemiſpheres diſpoſed triagonally, forming exact and equi-diſtant rows, with little channels between them. Thoſe in the upper diviſions A, B, C, much larger than thoſe in the lower diviſions C, D. Every one of theſe ſeems very nearly an *exact* hemiſphere, reflecting the images of ſurrounding objects; inſomuch that houſes, trees, &c. within a certain diſtance, appeared depicted on it, in the ſame manner as the windows are on the figure above.

There were 14,000 pearls or hemiſpheres in theſe cluſters; 3000 of the larger kind, 4000 of the ſmaller kind, in each protuberance. Each pearl is an eye, having the neceſſary humours, &c. yet probably the creature has viſion only of ſuch objects whoſe rays of light fall nearly coincident with the axis of the hemiſphere; and of theſe ſome may engage its attention more than others.

In the *Libella*, or *Dragon Fly*, Mr. Leuenhoek reckoned 12,544 pearls in each eye, placed hexangularly; he alſo numbered 6236 pearls in a *Silk-worm*'s two eyes when in a fly ſtate; 3181 in each eye of a *Beetle*; and 8000 in the two eyes of a common *Fly*.

In flies and aerial animals the pearls are placed in triangular rows; in *Crabs*, *Lobſters*, *Shrimps*, and other cruſtaceous water animals (whoſe eyes are leſs pearled) they are ranged in a quadrangular order: the loſs in number being compenſated by a ſmall power of moving their eyes when inſpecting objects.

F F. The horns.

G G. The ſmellers or feelers.

H H I. The proboſcis.

K. Hairs and briſtles.

The BLUE-BOTTLE FLY, *magnified.*

a. Its protuberant pearled eyes.

b. The forehead, ſcaly and prominent between the eyes, furniſhed with ſtrong black briſtles; from this grow two oblong parts *d d*, having joints into the forehead. Theſe in the head of the drone fly were called *horns.*

e e. Tufts of buſhy briſtles or feathers growing from *d d.*

f f. Four ſtrong briſtles placed in pairs, and bending toward each other juſt above the opening of the mouth.

g h i. The trunk or proboſcis iſſuing from the middle of the mouth, apparently hollow, and by its joints projected or withdrawn at pleaſure. From *h* to *i* ſeems divided into two lips, covered with hairs; theſe lips open or ſhut eaſily, and hold little pieces of ſolid food; but when the fly ſucks liquid, ſhe ſpreads them open, and applies their hollow part to the body on which ſuch liquid is, as on fruit, &c. whereby they become a kind of pump.

k k. Two little hairy oblong projections growing within the mouth, on each ſide the proboſcis; thought by Dr. HOOKE to be the organs of ſmelling or feeling (as G G, in the foregoing plate).

The thorax of this fly is cruſtaceous, ſtrongly made, its briſtles ſtanding backward like the quills of a porcupine; has ſix legs, covered with a hairy ſhell, each having eight joints, at the end of which are its claws, and ſoles which are ſpungy.

Of theſe ſix legs the fly ſeldom employs more than four to walk with; the two foremoſt anſwering many of the purpoſes of arms and hands.

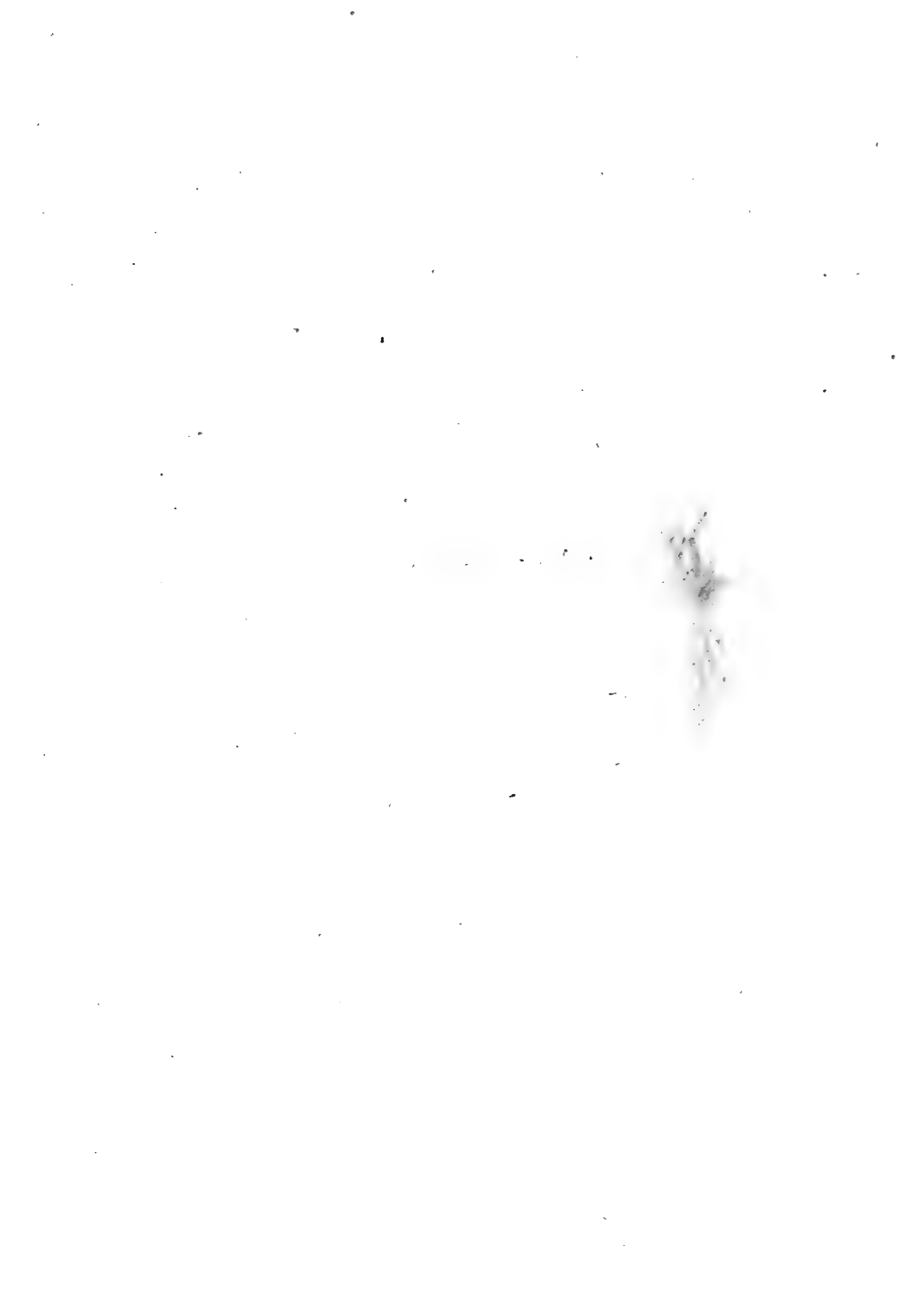
The TUFTED GNAT, *magnified.*

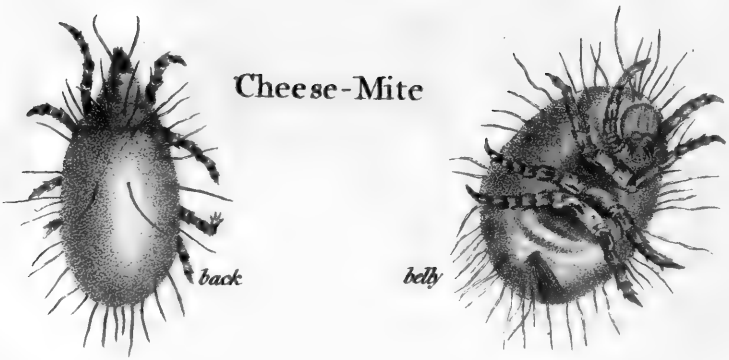
a. Its head, ſmall in proportion to its body, conſiſting chiefly of two cluſters of pearled eyes: juſt over theſe eyes, and ſomewhat between them, are two black balls, from whence iſſue two long horns, tapering and jointed like the horns of a lobſter; from theſe joints ariſe ſmall ſtiff hairs in a regular order.

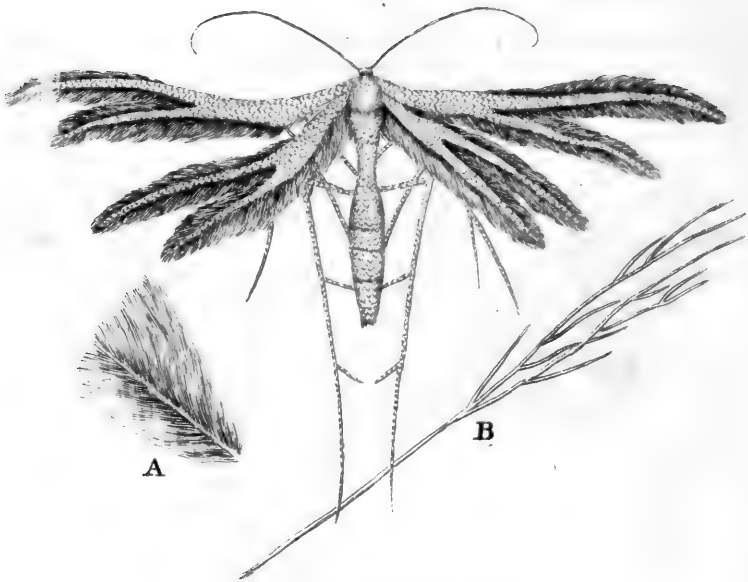
b. Is two other jointed horns, or feelers, projecting over the proboſcis *c*, which is a caſe covered with long ſcales, and, when not in uſe, concealed under the throat: its ſide opens, and emits four darts occaſionally, one being a ſheath to the other three: they are barbed toward the point. This head, with its appurtenances, is united to the thorax by a ſhort neck.

The Blue-bottle Fly

Magnified




Cheese-Mite
back
belly



Feather-winged Moth

The legs are long and ſlender, in number ſix, and having ſix joints; the feet are feathered, in a manner reſembling the ſcales of a fiſh, with many briſtles interſperſed: the wings are edged with a fringe of feathers; under each wing appears a projecting body, thought to be a poiſe or balance *d*, rounding at its extremity and under the wing. The belly of the creature is long, in nine diviſions; ſix of them tranſparent, the other three at the end opake. A ſmall, clear, white part *g* is ſeen beating like the heart in large animals.

The FEATHER-WINGED MOTH, *magnified.*

This is a ſmall white moth, ſometimes found on the nettle: it has four wings, each divided, very elegantly fringed on both ſides with exceeding ſmall white hairs, their ſtems inclining backward and downward. The body, legs, horns, and ſtems of the wings, are covered over with feathers of different ſhapes and ſizes, which come off when touched. A, repreſents one of theſe feathers; B, one of thoſe ſtalks which fringe the edges of the wings.

CHEESE MITE, *magnified.*

Back. Shape nearly oval, but obtuſe; the back covered with one entire ſhell, ſo curiouſly poliſhed that it reflects the pictures of all objects around it. The upper parts of the creature are diſtinct ſhells, and capable of being drawn in or thruſt out; as is alſo its ſnout.

Belly. This ſhews the under parts of a mite; the head is ſmall, has two eyes; the mouth reſembles that of a mole, appearing red within; has briſtles at the ſnout; is ſometimes ſeen munching and chewing the cud, like a Guinea-pig: has eight legs covered with a very tranſparent ſhell; each has eight joints, and a very ſharp hook or claw at the end; four of theſe legs move the body forward, the other four backward, when neceſſary: they are male and female, are oviparous, ſhed their ſkins ſeveral times, but never change their forms.

FINIS.

The legs are long and slender, in number six, and having six joints; the feet are feathered, in a manner resembling the feelers of a fish, with many bristles interspersed: the wings are edged with a fringe of feathers; under each wing appears a projecting body, thought to be a poisonous lance *d*, rounding at its extremity and under the wing. The belly of the creature is long, in nine divisions; six of them transparent, the other three at the end opake. A small, clear, white part is seen beating like the heart in large animals.

The FEATHER-WINGED MOTH, *magnified.*

This is a small white moth, sometimes found on the nettle; [illegible] four wings, each divided, very elegantly fringed on both sides [illegible] exceeding small white hairs, their stems inclining backward and [illegible]. The body, legs, horns, and stems of the wings, are covered over with feathers of different shapes and sizes, which come off when touched. A, represents one of these feathers; B, one of those stalks which fringe the edges of the wings.

CHEESE MITE, *magnified.*

BACK. [illegible] nearly oval, but [illegible]; the back covered with [illegible] shell, [illegible] obviously polished [illegible] the [illegible] around it. The upper parts of the creature are distinct [illegible] capable of being drawn in or thrust out; as is [illegible] its [illegible].

BELLY. This shews the under parts of a mite; the head [illegible] has two eyes; the mouth resembles that of a [illegible], appearing [illegible] [illegible] the [illegible]; is sometimes seen [illegible] and [illegible] [illegible]: has eight legs covered with a very transparent [illegible], each has eight joints, and a very sharp [illegible] at the end; [illegible] these legs [illegible] the body forward, the [illegible] [illegible] [illegible] and female, are oviparous, [illegible] [illegible] their forms.

FINIS.

INDEX

TO THE

PLATES.

A. Vol. I.——B. Vol. II.

		Page
A.		
African, —— Agami, ——	B. part 3.	3
	B. part 4.	31
Air, ——	A. part	12
Ant, ——	B. part 6.	315
Ants, North-American,	B. part 3.	3
Ant-bear, ——	B. part 3.	139
Ant-eater, ——	B. part 3.	140
Antipodes and Horizon,	A. part 1.	152
Anhinga, ——	B. part 4.	112
Ape (the long-armed)	B. part 3.	113
Armadillo, ——	B. part 3.	130
Autumn, ——	A. part 1.	145
Aſh-branch (vegetation)	B. part 6.	360
Atmoſphere and twilight,	A. part 1.	174
Atmoſphere, ——	A. part 1.	176
Atmoſphere and ſound,	A. part 1.	178
Avocetta, ——	B. part 4.	98
B.		
Bat, ——	B. part 3.	143
Bear (white) ——	B. part 3.	136
Beaver, ——	B. part 3.	123
Birds bills, ——	B. part 4.	10
Birds feet, ——	B. part 4.	10
Black Wolf, ——	B. part 13.	54
Bluebottle Fly, ——	B. part	368
Booby, ——	B. part 4.	118
Boiguacu, ——	B. part 5.	197

C.

		Page
Cachalot,	B. part 5.	215
Calao,	B. part 4.	40
Cameleon,	B. part 5.	158
Ceraſtes,	B. part 5.	191
Chalcide,	B. part 5.	163
Characters of the Signs	A. part 1.	117
Cheeſe Mites,	B. part	369
Chineſe,	B. part 3.	2
Coaita,	B. part 3.	117
Cockatoo,	B. part 4.	55
Combatant,	B. part 4.	103
Comets,	A. part 1.	120
Courſes of the ſuperior planets,	A. part 1,	108
Courſes of the inferior planets,	A. part 1,	104
Crocodile,	B. part 5.	150
Croſs-bill,	B. part 4.	72
Cutwater,	B. part 4.	363
Cuttle Fiſh	B. part 6.	328

D.

Diodon, or Globe Mole,	B. part 5.	229
Diver,	B. part 4.	124
Dragon,	B. part 5.	164
Dromedary,	B. part 3.	39
Duke (Great)	B. part 4.	19

E.

Eagle (Great)	B. part 4.	11
Ear,	A. part 2.	238
EARTH,	A. part 1.	267
Eclipſes, Lecture 3, plate 4,	A. part 1.	58
Eclipſes of Jupiter's Moons, Lecture 5,	A. part 1.	111
Eclipſes (and *Parallax*) Lecture 3, plate 3.	A. part 1.	56
Elephant,	B. part 3.	132
Erchins (Sea)	B. part 5.	257
Eye,	A. part 2.	236
Eyes of a Fly,	B. part 6.	367

F.

Feather-winged Moth,	B. part	369
FEELING,	A. part 2.	164
FIRE,	A. part 1.	280
Flamingo,	B. part 4.	91
Flea,	B. part 6.	368
Flowers, plate 1.	B. part 6.	361
Flowers, plate 2.	B. part 6.	361
Fly (Bluebottle)	B. part 6.	368
Flying Fiſh,	B. part 5.	238
Flying Squirrel (Great)	B. part 3.	99
Frog (Tree)	B. part 5.	172

G.

Galeote,	B. part 5.	157
Garden-bean (Vegetation)	B. part 6.	359
Gecko,	B. part 5.	161
Giraffe,	B. part 3.	135
Glacieres, 2 plates,	A. part 2.	235
Globe Mole (or Diodon)	B. part 5.	229
Gnat (Tufted)	B. part 6.	322
Great Eagle,	B. part 4.	11
Great Flying Squirrel,	B. part 3.	99
Great Shark,	B. part 5.	219
Great Duke,	B. part 4.	19
Guano (or Iguana)	B. part 5.	155

H.

Halo and Magnet,	A. part 1.	351
Harveſt Moon,	A. part 1.	101
Hammer-headed Shark,	B. part 5.	222
Hedge-Hog (Sea)	B. part 5.	230
HEARING,	A. part 2.	196
Heron,	B. part 4.	94
Hottentots,	B. part 3.	3
Hyena,	B. part 3.	62
Humming Birds,	B. part 4.	76

I.

Jacana,	B. part 4.	107
Jabiru,	B. part 4.	85
Iguana (or Guano)	B. part 5.	155
Ibis (White)	B. part 4.	84
Jupiter (views of)	A. part 1.	110

K.

Kamichi,	B. part 4.	86
King of the Vultures,	B. part 4.	19

L.

Laplander,	B. part 3.	1
Lecture 4, plate 5. *(ſhould have been marked Lect. 3, plate 5.)*	A. part 1.	59
Lecture 14, plate 2.	A. part 1.	341
Lecture 14, plate 3.	A. part 1.	344
Lecture 14, plate 4.	A. part 1.	341
Lecture 14, plate 5.	A. part 1.	349
Length of day and night,	A. part 1.	156

Long-

INDEX.

		Page
Long-armed Monkey,	B. part 3.	113
M.		
Magot,	B. part 3.	113
Mercury (views of)	A. part 1.	107
Mole (Quadruped)	B. part 3.	105
Mole (Fish)	B. part 5.	228
Monkey (Long-armed)	B. part 3.	113
Morse,	B. part 3.	129
Moth (Feather-winged)	B. part	369
Mouldiness,	B. part	361
N.		
NATURE, front	Vol. 1.	
Night Raven,	B. part 4.	97
North American,	B. part 3.	3
Nautilus,	B. part 5.	251
O.		
Opossum,	B. part 3.	119
Orb (Sea)	B. part 5.	230
Orbit of the Moon and Eclipses,	A. part 1.	54
Ostrich,	B. part 4.	131
P.		
Pangolin,	B. part 3.	129
Pear (vegetation)	B. part 6.	361
Pelican,	B. part 4.	112
Perspective view of the orbit of Saturn during his course, Lecture 5.	A. part 1.	114
Phases of the Moon,	A. part 1.	53
Phoca (or Seal)	B. part 3.	125
Pinna Marina, Pholade,	B. part 5.	251
Pipal	B. part 5.	117
Plan of the Solar System,	A. part 1.	75
Porcupine,	B. part 3.	109
Prismatic colours,	A. part 1.	341
R.		
Rattle Snake, pl. 1.	B. part 5.	198
Rattle Snake, pl. 2.	B. part 5.	199
Refraction,	A. part 1.	338
Rhinoceros,	B. part 3.	135
Ray,	B. part 5.	223
Rotation of the Earth,	A. part 1.	157
S.		
Salamander (three-fingered)	B. part 5.	167
Saturn (views of)	A. part 1.	116
Saw-fish,	B. part 5,	212
Scorpion,	B. part 6,	274
Sea Hedgehog,	B. part 5,	228
Seal (or Phoca)	B. part 3,	125
Sea Stars,	B. part 3,	365
Sea-orb,	B. part 5,	250
Sea-urchins,	B. part 5,	257
Seasons, Lect. vii. pl. 3.	A. part 1,	153
Seasons, Lect. vii. pl. 6.	A. part 1,	158
Secretary,	B. part 4,	87
SEEING,	A. part 2,	176
Shark (great)	B. part 5,	219
Shark (Hammer-headed)	B. part 5,	222
Shape of the Earth,	A. part 1,	150
Sheep (Wallachian)	B. part 3,	18
Sloth,	B. part 3,	140
SMELLING,	A. part 2,	208
Solar System (plan of)	A. part 1,	75
Spatula (or Spoon-bill)	B. part 4,	90
Spectacled Serpent (or Naja)	B. part 5,	192
Spots in the Sun, Lect. ii. pl. 1.	A. part 1,	33
Spots in the Sun, Lect. ii. pl. 2.	A. part 1,	34
SPRING,	A. part 1,	144
Springs,	A. part 1,	260
Squirrel (Great Flying)	B. part 3,	99
SUMMER,	A. part 1,	145
Sword-fish,	B. part	364
T.		
TASTING,	A. part 2,	221
Tides,	A. part 1,	264
Three-fingered Salamander,	B. part 5,	167
Tortoise,	B. part 5,	141
Torpedo,	B. part 5,	223
Toucan,	B. part 4,	41
Tree-frog,	B. part 5,	172
Tufted Gnat,	B. part 6,	322
V.		
Vegetation, (Ash-branch)	B. part 6,	360
Vegetation, (Wormwood root)	B. part 6,	359
Vegetation, (Pear)	B. part 6,	361
Vegetation, (Vine leaf)	B. part 6,	360
Vegetation, (Garden bean)	B. part 6,	359
Views of Jupiter,	A. part 1,	116
Views of Mercury,	A. part 1,	107
Views of Venus,	A. part 1,	107
Views of Saturn,	A. part 1,	116
Vultures, (King of)	B. part 3,	15

INDEX.

W.	Page
WATER,	A. part 1, 229
Water Spouts,	A. part 1, 211
Wallachian Sheep,	B. part 3, 18
White Bear,	B. part 3, 136
White Ibis,	B. part 4, 84
Winds,	A. part 1, 209
WINTER,	A. part 1, 146
Wolf (black)	B. part 3, 54
Wormwood root, (vegetation)	B. part 6, 359

QH
45
T3
v.2
1787
BioMed

Taylor, Charles
Surveys of nature
v. 2

PLEASE DO NOT REMOVE
SLIPS FROM THIS POCKET

UNIVERSITY OF TORONTO
LIBRARY